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THOMSON
ON
BRITISH CHOLERA

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HISTORICAL

BRITISH CHOLERA.

BRITISH CHOLERA,

ITS

NATURE AND CAUSES

CONSIDERED IN

CONNEXION WITH SANITARY IMPROVEMENT,

AND IN

COMPARISON WITH ASIATIC CHOLERA.

BY

SPENCER THOMSON, M.D.

L.R.C.S.E., & L.A.H.L.

“ Few have a clear conception of the influence of air and temperature on the health of the human body.”—LIEBIG.

LONDON :

JOHN CHURCHILL, PRINCES STREET, SOHO.

MDCCCXLVIII.



C. AND J. ADLARD, PRINTERS, BARTHOLOMEW-CLOSE.

Dedicated

TO THE

HEALTH OF TOWNS ASSOCIATION.

PREFACE.

THE author of the following Treatise cannot permit it to go forth, without appending some notice of two omissions, which by some might be considered serious defects. The first of these omissions, is the absence of post-mortem evidence. In the first stage of British or Bilious Cholera, any opportunity for examination could only be presented by death occurring from some coincident cause, and therefore the chance must be a very rare one—probably from the nature of the affection, there would not be much of pathological interest discoverable. Recorded examinations after death from the second stage of Bilious Cholera, give evidence only of such appearances as we might expect—more or less irritation of the mucous coat of the bowels, according to the extent and duration of the attack. The second omission, is the absence of direct proof from chemical examination, of that condition of the blood, which from other evidence is considered to

constitute the disease. Few medical men in practice, especially in the country, have time and opportunity for conducting quantitative analysis with sufficient accuracy to make it worth anything; on the other hand, chemists often err from their ignorance of practical medicine: but let the practitioner join his clinical experience to the analytical inquiry of the chemist, and we may then expect results more certain and useful than can accrue from the single-handed investigation. The arguments of the following pages may induce some one when the opportunity again occurs, to make a careful analysis of the blood in cases presenting the initiatory symptoms of British Cholera.

SPENCER THOMSON.

HAUNTON, CLIFTON CAMPVILLE,
BURTON-ON-TRENT.

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BRITISH CHOLERA.

INTRODUCTION.

IF the periodical recurrence, epidemic diffusion, and frequent severity and fatality of any disease, render it worthy of investigation, few have stronger claims upon our attention than the regular summer and autumn visitant of this country,—the British and Bilious Cholera, which at the present time, perhaps, possesses more than ordinary interest, first, from its connexion with the cause of sanitary improvement so generally agitated, and secondly, from the question whether the resemblance of some of its severer forms to its pestilential Asiatic synonyme, is the resemblance springing from actual identity of cause and essence, or is resemblance merely. To some it may appear that a work of supererogation has been undertaken, and that a disease so long and familiarly known, must have been fully investigated, and its most minute details unveiled. Were the views promulgated in the following pages, a

compilation or embodiment merely of those which have been already generally received on the subject, the labour would indeed have been superfluous. Such, however, is not the case. The daily advancing science of organic chemistry, by placing in clear and frequently convincing light, the chemico-vital processes of the living system, now offers many advantages which were formerly denied in the investigation of disease. Having in the present instance availed himself of the aid of that science, having compared some of its facts and doctrines with the results of careful examination of the history and symptoms of the disease in question, and supported the deductions from that comparison with arguments drawn from sources of general information, the writer of the following pages trusts that he has been enabled to render the truth of the opinions and suggestions therein advanced, at least highly probable. Writers generally upon the subject of bilious cholera, have confined their disquisitions, mainly at least, to a consideration of the most prominent features of the malady,—the vomiting and purging, and their attendant symptoms; neglecting to notice that comparatively obscure but really most important initiatory stage, which constitutes the disease itself. In the following pages, the features and symptoms of what, for the sake of clearness, under the present acceptance of terms, must con-

tinue to be named the initiatory stage of British Cholera, have been particularly dwelt upon. The attempt has been made to trace the symptoms of this stage back to their proximate cause, a vitiated condition of the blood, and further, to connect that vitiation with its primary source—heat. When it is reflected how much better it is to prevent than to cure a disease, it will not be thought that too much attention has been given to the verification of premonitory symptoms, and investigation of the origins of a disorder, the influence of which can only be destroyed when its real nature is understood.

It is not intended to represent that some at least of the views mooted in the following treatise, have not been brought forward already: Dr. Copland, in different articles in his valuable Dictionary, adduces many of those respecting the connexion between biliary disorder, accumulation of carbon in the system, and high atmospheric temperature; even there, however, they are not systematized. Neither in Dr. Copland's work, nor in any other which has come under the notice of the writer, is the well-marked stage of initiation or formation of bilious cholera, noticed as a real or even important feature. In consequence of this oversight, many erroneous notions have been entertained respecting the dis-

order, and it has been frequently confounded with other affections of the alimentary canal, presenting somewhat similar symptoms. Some of these erroneous ideas are not only negatively hurtful, but positively injurious, especially that entertained by the public generally, and by many of the profession, that the use of fruit in summer and autumn, is a chief, if not the only cause of bilious cholera. That the use of unripe fruit, or of some particular sort, especially of stone fruit, in peculiar constitutions, or even the abuse of the most wholesome kinds, may produce a species of diarrhoea, is not denied; but certainly, bilious cholera can never take its origin from such a cause.¹ Indeed, it will be fully demonstrated, that the provision of wholesome, watery, subacid fruits, during hot weather, and in hot climates, is rather a providential arrangement for the prevention of disease, than a source of its production. Certainly nothing can arm us more thoroughly against future epidemics of British cholera, than a correct knowledge of the symptoms which mark its first formation in the system, nor can anything aid more the cause of prevention, than scientific elucidation of the influences for good or

¹ When the disease is formed in the system, it may seem to be produced by fruit, or even by medicine, or, indeed, by anything else which, by causing increase of the peristaltic action of the bowels, would probably precipitate the crisis.

evil exerted upon the human economy, through the food, atmosphere, or social or personal conditions. Lastly, in addition to minor comparisons, that of British cholera with its Asiatic synonyme, is perhaps a fitting conclusion for this Treatise. The doubt and obscurity which still exist respecting the causes and nature of the latter fearful scourge, render any suggestions interesting and useful; indeed, suggestions and opinions are at present all that can be offered, but some of these may smooth the way for the researches of the microscope, and of organic chemistry, that is, if the essence of the pestilence come within the range of their powers. Next to showing what a disease is, it may be of some use at least to attempt to show what it is not, and thus the conclusions arrived at respecting the essential nature of the British cholera, may afford some facility in the examination of the Asiatic disease. In comparing the two diseases in the following treatise, they are regarded as entirely distinct affections, depending primarily upon entirely distinct causes; but though similarly fostered, and although the features which attract most attention are closely similar in both, many less prominent but essentially characteristic points of difference are to be found. Notwithstanding these essential differences, however, the possibility of the British disease inducing or lapsing into the Asiatic, renders the same sanitary

precautions applicable to both, especially the precautions respecting atmospheric purity ; for if, as thought by many, electrical excitement has really any share in the production of Asiatic cholera, the chance of its increase must acquire double intensity, when noxious vapours on the one hand deteriorate the blood, and on the other, convey the electric virus, so to speak, to the nervous organism.

CHAPTER I.

HISTORY AND SYMPTOMS.

2. Report of Registrar-General.—3, 4. Effect of Heat generally ; neglected Hygiene.—5. Initiatory Stage of Epidemic Bilious Cholera.—7. Terminating, or Vomiting and Purging Stage.—8. Ordinary Severe Form of Bilious Cholera.—10. Severest Form.—12. Stage of Febrile Hepatic Irritation.

1. THERE are many individuals in this country who regularly suffer in health from the ordinary warm weather of our usual summers : when, however, a hot, almost tropical, season surprises us in the midst of habits and circumstances, not only unsuitable to, but really rendered actively injurious by, the unusual condition of our external relations, the number of affected individuals is very greatly increased. This condition of things was most extensively realized during the summer and autumn of 1846,—seasons, remarkable, not only for a continuation of elevated temperature seldom experienced in this northern latitude, but seasons also which have been proved, by the Report of the Registrar-General, to have been no less remarkable for the great and startling increase of disease and of mortality which took place during the quarter ending September the 30th ; or,

in other words, during that period when the heat was most intense.

2. The Report above alluded to is taken from 115 districts of England, 34 of these being metropolitan; the remaining 81 comprise the principal towns and cities, and some agricultural districts. In 1841, the population of these districts amounted altogether to 6,579,693. In these districts, within the quarter alluded to, ending September the 30th, 51,235 deaths were registered, a number exceeding the deaths of the corresponding quarter of 1845 by 15,227. In London¹ the deaths exceeded those of the corresponding quarter of 1845 by 1567; of that excess, 1303 were from cholera, diarrhœa, and dysentery. The mortality from intemperance, delirium tremens, jaundice, liver disease, and rheumatism was also greater than usual. Almost universally throughout the kingdom there was an increase of death, more or less; and in some of the large towns, as Birmingham, Liverpool, Manchester, Salford and Chorlton, Sheffield, &c., the mortality was nearly doubled. Here we have evidence the most incontrovertible, that simultaneous with the occurrence of an unusually hot, almost tropical season, in the generally temperate climate of Britain, there occurred a

¹ The average mean temperature in the metropolis for the quarter ending September the 30th, 1846, was 63°·1, while in the corresponding quarter of 1845 it was 57°·1. See Report.

remarkable increase in the amount of illness and death, principally arising from one particular class of diseases, namely, diarrhœa, simple or with the accompaniment of bilious vomiting (when it is usually named British or bilious cholera), dysentery, jaundice, and others, which are closely connected with the hepatic system.

3. In addition to public statistical evidence, experience, both private and professional, tells us that in ordinary seasons the advent of hot weather is always marked by a sensible increase of disease connected with the biliary organ.

4. From the above facts, nothing can be clearer than the relation of cause and effect, in which a continuation of elevated temperature, and the occurrence of diseases connected with the liver and its functions, stand to each other; to quote the words of Mr. Annesley, "the influence of the direct rays of the sun and a high range of temperature in producing hepatic derangement, cannot be doubted." Taking this as an established fact, and it is probable that, under conditions the most favorable, and in circumstances the best arranged, we shall still find heat and liver affections maintaining the same relations;¹

¹ Dogs from Europe, which of course are not subject to many of those influences which affect man, are known, when taken to Southern India, to suffer from the "severest form of liver disease."—Dr. Searle, *Lancet*, Dec. 4th, 1841.

it remains to be seen whether it is necessary that the evils springing from those relations must be of so great an extent as hitherto, or whether they are not increased tenfold by the almost universal public and private neglect of all sanitary precautions, by ignorance of those changes preventive of disease, which ought to be made in our usual habits to meet the unusual circumstances, and by further ignorance of the first symptoms of the consequent maladies, and of the necessity for their immediate removal.

5. Probably, the best method of illustrating our subject, will be to trace the history of the epidemic bilious cholera of the summer and autumn of 1846, as it occurred in private practice. Very soon after the commencement of the hot weather, early in June, a succession of cases, marked by peculiar but very distinct symptoms, began to present themselves for treatment; these symptoms were all indicative of disorder of the liver, and of the consequent general derangement and clogging of the bodily functions. The most prominent complaints were of general feeling of lassitude, and inaptitude for exertion, physical or mental; with depressed spirits; headache, especially after meals; sleep disturbed by disagreeable dreams, or very heavy; *and constant insuperable drowsiness in the daytime*, particularly after

meals ;¹ mouth clammy, dry, and tasting disagreeable and bitter, especially on waking in the morning ; appetite indifferent ; occasional increase of thirst ; after meals, painful sense of fulness and distension, extending from the epigastrium into the hypochondria ; pain, constant or intermittent, between the scapulæ, extending up the back of the neck ; painful sense of fulness in the cerebellum, and itching of the scalp posteriorly. The bowels irregular, griping occasionally present ; the urine sometimes unaffected, but generally deeply tinged, and depositing urate of ammonia of various shades of colour, or deep-coloured uric acid. In females the catamenia much darker than common, and more offensive. The breathing, in some cases impeded, particularly if there existed any chronic affection of the chest ; the pulse, if affected, was slower than natural ; the limbs ached upon slight exertion ; perspiration easily induced ; the hue of the skin was dusky, but not yellow.

6. The cases characterised by the above (5) symptoms, were all of them readily cured by appropriate treatment (44) ; they all, however, presented one peculiarity, the readiness and frequent violence with which simple mercurial medicines acted as purgatives even in minute doses, with immediate relief to the patient.

¹ This symptom, never absent, and much complained of, was less strongly marked in patients of excitable nervous temperament than in those of an opposite character.

These remedies, in fact, produced a mild artificial cholera; the slightest cholagogue stimulus proving sufficient to occasion the excretion of large quantities of ill-conditioned bile from the previously torpid and congested liver. Dr. Copland, in treating of bilious diarrhœa,¹ mentions this effect; he says, "An aperient or a purgative medicine may even excite it (diarrhœa) if the biliary organs be loaded at the time with morbid or acrid bile."²

7. As the hot summer advanced, cases presenting the symptoms above enumerated became still more frequent, and many persons who did not seek for timely medical relief, were at last forced to do so, when, after enduring the premonitory disorder for a longer or shorter period, it terminated in an attack of bilious cholera or diarrhœa. Frequently, those attacks were mild, so much so, that the patient did not use any remedial measure; the constitution was relieved by the discharge as if it had been caused by medicine, and health restored; at other times this salutary discharge being stopped, either artificially or naturally, partial relief only was obtained, the symptoms continuing, at first with abated, but afterwards with increasing intensity, till another crisis, partial or effectual, ensued. The mild attacks of

¹ Art. Diarrhœa, Dict. Pract. Med.

² Reference to cases 1, 2, and 3, § 44, will further illustrate and confirm the foregoing observations.

diarrhœa, were characterised chiefly by the passage of, at first, dark bilious stools, with more or less griping; the stools becoming lighter in colour, and more natural, and the griping ceasing simultaneously; perhaps, too, slight bilious vomiting occurred. Between this mild form, and that in which the disease assumed the intensity and symptoms of malignant cholera, cases of every degree presented themselves. The symptoms which have been described as characteristic of the premonitory or first stage of the disease, when not removed by the milder natural crisis, or by medicine, continued unchecked, till at last the confined and accumulated *materies morbi* burst forth in an attack of bilious cholera, more or less severe, according to the condition and constitution of the individual.

8. The commencement of one of the more severe attacks was generally ushered in by shivering, and frequently attended by distressing giddiness, owing to the presence of bile on the stomach, the sickness and purging generally commenced suddenly, often in the night waking the patient from sleep; the bowels were severely griped, any food which might be in the stomach was quickly rejected, accompanied with, and followed by more or less bile and mucus, the whole being forcibly ejected; the vomiting was frequently most distressing, and the retching continued long after bile had ceased to be thrown up,

being sustained either by induced irritability of the stomach, or by sympathy of that organ with spasmodic action in the bowels occasioned by the passage of vitiated bile, this spasmodic action being particularly painful in the umbilical region. The evacuations from the bowels were very frequent, and caused severe smarting, with tenesmus; when examined, they were found to be of a dark brown or olive hue, slimy, and very offensive. Great thirst was a constant attendant upon the attack notwithstanding the fluid drank was immediately rejected. The passage of the urine occasioned smarting and scalding, owing to its greater condensation consequent upon the watery discharge from the bowels, and probably also to its containing an unusual amount of ingredients "rich in carbon." There was extreme prostration of strength, frequently severe cramps in the limbs; the skin was cold, often covered with a cold sweat; there was much anxiety.

9. If an attack of bilious cholera as above described was about to terminate favorably, the vomiting abated; the pains in the limbs were mitigated; the alvine discharges caused less pain and tenesmus, were not so frequent, and their colour became more healthy; the skin becoming warmer, the restless anxiety was relieved by refreshing sleep. In some instances, however, these desirable symptoms did not appear: an irritable stomach continued,

rejecting everything swallowed ; vitiated bile continued to be poured into the alimentary canal, and the purging was unabated ; or the bowels became irritable, the motions lost their feculent or bilious character, and resembled dirty greenish water, in which floated membranous-looking shreds ; the abdomen was tender, the tongue red at the tip and edges, dry or brown ; subacute inflammation or ulceration of the mucous coat of the bowels supervened, accompanied with low fever of a typhoid character ; the strength of the patient was quickly exhausted, and he often sank rapidly.

10. Severer still at the first onset than the cases already mentioned, were those which simulating at least the malignant disease, presented symptoms of severe affection of the nervous or ganglionic system. In these cases, one of which¹ is detailed (47), the bilious excretions very soon gave place to those resembling thin gruel or rice water ; at the same time symptoms of collapse quickly supervened, the pulse became almost imperceptible, the urinary secretion was almost entirely or totally suppressed, and distressing cramps attacked the muscles of voluntary motion, the thirst being most intense. These cases either terminated with the death of the patient in the collapse stage, rarely in low typhus, or in recovery more rapid than might have been expected.

¹ Case 8.

11. There yet remains to be noticed another class of cases, which, although they may not appear strictly to fall under the head of what is usually described as bilious or British cholera, are nevertheless part and parcel of the same abnormal and diseased actions, and owe their origin to precisely similar causes. In these cases, which, almost without exception, occurred towards the close of the hot season, there frequently had been no attack of either bilious vomiting or purging, or, if there had, the system was not freely relieved by it; there existed, nevertheless, generally for a considerable time previously, symptoms of disorder referable to the liver, its functions and connexions: to these symptoms, moreover, were added others, indicative, if not of subacute inflammation, at least of active irritation of the organ, the pain in the hepatic region became more acute, and there was perceptible tenderness on pressure, feverish symptoms supervened, the pulse rose to 100, there were thirst, heat of skin, and nocturnal sweating: the urine in almost every case deposited the urate of ammonia, deeply tinged with purpurine, which has been said by Dr. Golding Bird¹ and others to be so strongly diagnostic of hepatic irritation.

12. Such are the leading features of the disease Bilious or British Cholera. In the foregoing description, however, a much wider range of symptoms

¹ Bird on Urinary Deposits, p. 171.

has been taken than is done in the usual description of the disorder, in which the last or concluding stage, that of vomiting and purging, usually occupies the prominent place, to the exclusion of those other symptoms, which if less strongly marked, and less likely to attract the attention either of the practitioner or of the patient, are, notwithstanding, the most important, seeing that attention to their warnings when actually present, and consideration of their causes, proximate and remote, might not only in most, avert the threatened outbreak of a distressing and not unfrequently dangerous malady, but also destroy many of those causes which first originate the diseased actions.

CHAPTER II.

PRIMARY ORIGINATING CAUSE.

13. Recapitulation and Deduction.—15. Ordinary Habits in Britain not adapted for hot Weather.—16. Animal Heat, connexion with Carbon and its Oxygenation.—17. Influenced by external Temperature, &c.—18. Accumulation of Carbon, Cause of Bilious Cholera.—19. Illustrations; Poisoning by Charcoal Fumes.—20. Effects of intense Cold.—21. Jaundice.—22. Cyanosis.—23. Diminished Power of Oxygenation; Chlorosis.—24. Rarefied Air.—25. Chronic Bilious Dyspepsia.—26. Recapitulation and Deductions.

13. IN the preceding chapter, it has been proved by the most accurate statistical detail (2), that during the unusually hot summer of 1846, the prevalence and fatality of diseases connected with the biliary system and alimentary canal, comprising the disease usually named British or bilious cholera, in all its varieties, was most remarkable; and that too, let it be noted, in a summer and autumn likewise remarkable for the scarcity of that fruit which both professionally and popularly is so commonly accused of having a great share in the production of the above disorders. It has further been shown, that the actual vomiting and purging, and their frequent accompaniments and consequences, to which the appellation British cholera is usually

applied, constitute but one, and that the concluding stage of a disease, the progress of which in the system, has been marked by certain constant and well-defined, though comparatively obscure, symptoms,—obscure at least when compared with those of a more violent nature, which have monopolized the treatment and attention both of the profession and of the public. In accordance with this, we have seen that nearly simultaneous with the advent of the hot weather in June 1846, cases presenting these “comparatively obscure” symptoms, began to occur, for some time previous to the outbreak of the disease itself, as it is generally called, that is, of the actual vomiting and purging, and that the cases presenting these premonitory symptoms, were quickly and easily relieved by a treatment in some degree imitative of the natural termination of the affection. Lastly, the disease, and the unusual and prolonged hot weather, have been seen to progress in a parallel course, both attaining their climax about the same period, and gradually subsiding together. On the above, it has been thought legitimate to base the proposition,—that high atmospheric temperature and the disease British or Bilious Cholera, stand related as cause and effect.—It is not, however, assumed that heat is the sole cause, but only that while it is the prime agent, it is also the great agitator of those numerous other accessory

sources of the disease to be hereafter noticed, which have their origin in the personal habits and external relations of individuals, and in the neglect of sanitary precautions by the public generally, both socially and politically.

14. Although it is assumed (13), that the connexion between heat and the production of biliary disorders generally, and bilious cholera particularly, is proved by the experience both public and private, embodied in the foregoing observations, it is not the intention to rest on these proofs alone, but to draw for confirmation, upon the researches of modern science into the effects of continued elevated temperature, acting through various agents upon the functions and constituents of the living human body.

15. In the climate of Britain, under ordinary circumstances, and with ordinary habits, most individuals enjoy an average proportion of health; natural appetite and individual experience indicate to each the proportion and kind of aliment, liquid and solid, necessary for the maintenance of the balance of functions, and consequently for the preservation of bodily health: most persons too, who value health and activity of body and mind, endeavour to fulfil these organic laws in a greater or less degree, according to their knowledge or inclination. Our clothing and habitations also are generally

fitted for the ordinary level and exigencies of the climate. But the relation of things becomes abundantly different, when the average atmospheric temperature continues much elevated for any considerable period, or indeed under the ordinary circumstances of most summers and autumns. The usual habits, and perhaps indulgences of many—such as the free use of animal food and stimulants—have become so necessary, at least to ideal comfort, so much a second, an artificial nature, that they obtund the feelings and faculties to the promptings of Nature herself, who would lead us right ; or even if these indulgences are known to be hurtful, their relinquishment calls for an exercise of self-denial too great for many. The free animal diet which has become distasteful, is spiced and condimented by the wealthy in every way to render it attractive ; the languor consequent upon errors of diet by the rich, upon foul air and want of cleanliness by the poor, is sought to be removed in both cases by increased stimulant, which increases only the feeling it is intended to correct, and the causes of that feeling. When under the circumstances we are discussing, ill-regulated personal habits are aided and abetted by wholesale private and public neglect of sanitary precaution, it cannot be a matter for surprise that disease and death are rampant, vindicating Nature, and demonstrating their own

parentage, in their course through crowded alleys and crowded dwellings in town and country, through undrained cities and unsewered villages ; but whilst visiting the dwellings of the poor, “ who perish for lack of knowledge,” not forgetting to knock at the rich man’s door, “ who fares sumptuously every day,” but who, under his “ fine linen,” frequently carries a skin a stranger to ablution.

16. It may be said with certain limitation, that man’s natural or animal heat is independent of the temperature of the surrounding atmosphere, for we find, that when in health, he preserves that heat alike within the arctic circle, or under a tropical sun. If, however, the heat of the body remains the same, the means and conditions necessary for the preservation of that heat, vary much in different situations and climates ; if these conditions are not observed, disorder or disease must necessarily ensue. We have said that in consequence of the non-observance of these laws, the disease which forms the subject of this treatise is generated.

17. Without entering into physiological discussion, it is sufficient for our purpose that the cause of animal heat is admitted by physiologists generally, to depend upon “ the mutual action between the elements of the food” (or at least of what were originally elements of the food), “ and the oxygen conveyed by the circulation of the blood to every

part of the body ;”¹ or in other words, that “ in the human body, the fuel for the production of animal heat is derived from the metamorphoses of the living tissues, from the bile, from fat, and from the hydro-carbonaceous materials of the food.”² Thus, “ if food be the first condition of life, oxygen is the second.”³ The element of the food or of the bodily constituents which plays the principal part in this process, is carbon.⁴ In the words of Baron Liebig, “ it is, strictly speaking, the carbon of the compounds formed in the metamorphoses of living tissues, that serves for the production of animal heat,”⁵ the element, after its combination with oxygen, being expelled through the lungs and skin in the form of carbonic acid. In fact, as far as regards the generation of heat, the living animal body has been aptly compared to a furnace, which requires to be kept up to a particular temperature, and which for that purpose we must supply with fuel, the carbon contained in our food constituting the principal part of that fuel, albeit, the supply must vary according to the external temperature.⁶

¹ Liebig’s Organic Chemistry of Physiology and Pathology, p. 17.

² Mr. Ansell, *Lancet*, Feb. 4th, 1847.

³ *Ibid.*

⁴ The share taken by the hydrogen of the food, or of the tissues, in the production of animal heat, is not prominently noticed, as not bearing directly upon the subject.

⁵ Liebig’s Physiological Chemistry, p. 62.

⁶ *Ibid.* p. 21.

The capillary system generally of the animal frame may be compared to the great body of the furnace, in which this slow combustion, this generation of heat, is going on ; other two great systems of capillaries, the lungs and skin, fulfil the dual offices of draught-holes and funnels, as it were, to the furnace ; by these great organs, the oxygen which is to consume is taken in, and the consumed carbon which would be hurtful is expelled,¹ as carbonic acid.² Further, lest the blood should be super-saturated with this carbon, another great capillary system, the hepatic, is added, to filter it off in bile, from that portion of the blood most likely to be loaded with it ; not, however, in this form, to be cast out as useless, for now not only is it adapted to perform an important office in the digestive functions, but if the ingenious theories and demonstrations of Baron Liebig be correct, adapted also for combustion, it again enters the circulation, to unite with oxygen, previous to its final expulsion from the system³ as carbonic acid. Thus we find that nearly

¹ Lavoisier, Abernethy, Spallanzani, Edwards, &c. &c.

² The capillary system of the mucous membrane of the stomach and bowels has been said to assist the lungs and skin as a respiratory organ, and to aerate the blood in some degree for the purpose of assisting hepatic capillary action, the oxygen being conveyed to the stomach in food, saliva, and in water. Majendie mentions 11 per cent. of oxygen found by him in the gas contained in the stomach of a criminal.—*Medical Times*, Oct. 3d, 1846.

³ Liebig's *Physiological Chemistry*, p. 60 et seq.

every particle of carbon which is taken into the body, with the exception of a small portion excreted by the kidneys, and in the fæces, undergoes the process of oxydation or combustion, and must necessarily contribute to maintain or augment the animal heat; for “in whatever way carbon may combine with oxygen, the act of combination cannot take place without the disengagement of heat. It is a matter of indifference whether the combination take place rapidly or slowly, at a high or at a low temperature; the amount of heat liberated is a constant quantity.”¹

18. After what has been said, it requires no demonstration to prove, that between the carbon introduced into the body in the food, and the oxygen introduced by the lungs and skin (and stomach), some sort of proportion or balance must be maintained; disturb that balance beyond the compensating power of the system, and disorder or disease must be the consequence. “But the quantity of oxygen inspired is affected by the temperature and density of the atmosphere.”² Dr. Copland³ says, “It has been shown by the experiments of Prout, Fyffe, Allen, and Pepys, in an artificially increased temperature, and by those I made in an intertropical atmosphere, that

¹ Liebig's *Physiological Chemistry*, p. 18.

² *Ibid.* p. 16.

³ Copland's *Medical Dictionary*, art. Disease.

heat remarkably diminishes the changes effected by respiration on the blood.” Here, then, without going further, we have proof that a long continuance of elevated atmospheric temperature, by diminishing the quantity of oxygen inspired, by impeding the changes effected by respiration on the blood, must be incompatible with the introduction of as much carbon into the system during a hot season as during a temperate or cold one ; for not only is the quantity of oxygen introduced into the system in a cool temperature greater than in a hot, on account of the greater condensation of the air, but also in consequence of an additional quantity of the gas being supplanted by the greater amount of watery vapour contained in the hot air of summer. In further illustration, it has been calculated by Liebig, that in Germany one eighth more oxygen is individually consumed in winter than in summer. Moreover, the inactivity induced by hot weather, by diminishing our movements, and consequently the frequency of our respiration, cuts off another source of the supply of this important element. If, with everything thus tending to diminish the supply of oxygen, the same amount of carbon, in the shape of highly carbonized food and drink, is thrown into the system, in which it cannot be consumed, it must necessarily accumulate, and accumulate it does ; the blood, half purified, circulates slowly, and the whole train of symptoms

which have been enumerated (5) as constituting the first stage of the disease in question, and as heralding the approach of the second stage, that of vomiting and purging, is quickly developed. These symptoms are all highly characteristic of a blood loaded with carbon. The torpid nervous system, *the overpowering drowsiness* (5), the headache, the dusky skin, the high-coloured urine, the dark catamenia, and the digestive functions generally, disordered by and sympathizing with a liver congested and oppressed by its additional duties.

19. That such are the effects of an accumulation of carbon in the blood, may be verified by a consideration of those cases in which we have every reason to believe that the element exists in that fluid superabundantly, in some shape or other: such a condition, among others, is that of poisoning by the fumes of burning charcoal; here we know that carbon must have entered the system in the form of carbonic acid or carburetted hydrogen, and almost its first, its leading, its unfortunately too well known effect, is the production of intense drowsiness ending in death. Mr. Taylor says,¹ “When the gas enters into the pulmonary cells, it is probably absorbed by the blood, and circulated with that fluid through the body. Its specific action on the brain may be inferred from the headache, vertigo, somnolency and

¹ Medical Jurisprudence, p. 613.

coma, which follow its introduction, as also from the loss of muscular power in persons labouring under its effects.” Here we have merely a reiteration of many of the prominent symptoms of the initiatory stage of British cholera. The progress of cases of poisoning by charcoal fumes, is generally too rapid to admit of the development of other minor symptoms, but examination after death has proved, that venous congestion of the liver and of the brain¹ are among the most prominent pathological consequences,—consequences the symptoms would lead us to expect, but which, fortunately, we have no opportunity of comparing with those produced in the initiatory stage of bilious cholera, but by the symptoms. It is worthy of remark, however, that the usually dark blood² corresponds with the condition of that fluid indicated by the catamenial discharge in persons presenting the symptoms of the first stage of the above disease (5).

20. Symptoms and appearances not very dissimilar to those we have been discussing, likewise result from the action of intense cold upon the human constitution. The fatal drowsiness rendered so famous by the cases of Sir Joseph Banks and Dr. Solander, in Cooke’s Voyages, is well known, and has been frequently recorded. The case of cold, is one, which, at first sight,

¹ Christison on Poisons, and others.

² Dr. Golding Bird says that the blood is sometimes fluid in cases of poisoning by carbonic acid.—Med. Gazette, March 16th, 1839.

might appear to contradict former arguments, but, really, it does not ; for, notwithstanding the greater condensation of the air, intense, long-continued cold actually impedes the oxygenation of the blood, by its depressing influence on the nervous system and on the respiratory movements ; further also by interfering with the action of the skin. Dr. Alison says,¹ “The very same diseases of the brain have often been found to result from incautious exposure to cold, as from intense heat.” Dr. Copland² mentions the power of cold, especially when combined with moisture in impeding the functions of the skin, and in the same paper, quotes authorities³ who have recorded congestion of the brain and of the abdominal viscera generally, as among the results of fatal exposure to cold.

21. Jaundice furnishes us with further illustration for our subject. In this disease, we know that carbon, in the form of some of the biliary constituents, is retained in the blood, and circulates with it. The symptoms bear a close resemblance to those which have been said to constitute the first stage of bilious cholera ; in the latter disease, however, the yellow colour is not developed, duskiness of the skin being the limit of the visible presence of carbon, owing doubtless to the

¹ Outlines of Pathology, p. 381, second edit.

² Dictionary of Practical Medicine, art. Cold.

³ Quelmaley, Rosen, Cappel, Dr. Kellie.

elements of bile only, and not the formed secretion being mixed with the blood. There is, however, in jaundice, great languor and intense drowsiness: these symptoms are ascribed by the writer of the article Blood, 'Cyclopædia of Practical Medicine,' to the colouring matter of the bile. His words are —“ It appears to act as a narcotic poison upon the brain, inducing drowsiness.” Further, in jaundice we have the same excretions of highly-carbonized matters by the kidneys, and also of symptoms directly referable to the liver; these symptoms, no doubt, arising from the cause assigned to them by Dr. Copland,¹ who says the accumulation of the elements of bile in blood, with other effete matters, will excite the liver, and give rise to an abundant as well as acrid or otherwise morbid bile. Suppression of bile is said to produce coma.²

22. Cyanosis affords us another instance of the effects of imperfect oxygenation of the blood; in the words of Dr. John Crampton,³ there exists “ weakness, languor, and an engorged state of almost every organ; symptoms generally associated with a want of the due oxygenation of the blood in the pulmonary circulation;” also “ the functions of the liver and other organs of assimilation are principally deranged,

¹ Dictionary of Practical Medicine, art. Disease.

² Alison's Elements of Pathology, p. 542.

³ Cyclopædia of Practical Medicine, art. Cyanosis.

for want, in some instances, of blood properly renovated in quality." In death from pure asphyxia, we have the same internal congestions from retention of carbon in the blood, as from its direct introduction into the fluid. According to Bichat, the primary effect of venous blood in asphyxia is on the brain.

23. There yet remains for consideration another class of cases, very different indeed from those already discussed, but yet no less illustrative of the subject in hand. They are such as present an anæmic or chlorotic condition of the system. In these cases, although no greater, if so great, a quantity of carbon is introduced into the body than is necessary to maintain health, we have symptoms indicative of a superabundance of that element, a condition which we must be prepared to expect, when it is called to mind how greatly the oxygenating power of the blood must be diminished, considering that in some cases of anæmia or chlorosis, there is a deficiency of considerably more than one half of the red corpuscles.¹ Denis describes the anæmic condition, as, "blood in too small a quantity, containing too few corpuscles for the constitution of the individual." The supply of oxygen thus diminished in consequence of the failure of its recipient and distributing agents, the

¹ Ansell's Lectures on Blood, *Lancet*, Sept. 12th, 1840.

red corpuscles, we find in addition to other symptoms, those indicative of an excess of carbon, more particularly, languor, *extreme drowsiness*, and *very heavy slumber*.¹ It is almost certain, also, that the yellow hue of the skin in chlorotic subjects, and the offensive perspiration, are owing to the same cause, the accumulation of carbon and its compound in the system, from want of due oxygenating power. This view is strongly supported by the following remark of Liebig. He says :¹ “Over the whole surface of the body oxygen is absorbed, and combines with all the substances which offer no resistance to it. In those parts of the body where the action of oxygen is impeded, for example, in the armpits or in the soles of the feet, peculiar compounds are given out, recognisable by their appearance and odour.” In the case of the armpit—diminished supply of oxygen on a small scale, the odour and dark colour are nearly, if not quite, similar to the phenomena of chlorosis, diminished supply on a large scale.

24. The drowsiness and inaptitude for exertion complained of by travellers who have ascended to great elevations, are ascribable only to the diminished

¹ This latter symptom in anæmic states, though not generally noticed, is one which has frequently occurred to the writer to remark particularly, and will be found to constitute a prominent feature in such cases. The sleep has all the characters of narcotism.

² Chemic. Physiol. p. 29.

supply of oxygen furnished by the rarefied air. Lastly, the action of narcotics in producing drowsiness has been attributed by my relative, Dr. A. T. Thomson,¹ partly to their power of diminishing the activity of respiration.

25. The one great leading symptom, drowsiness, is a constant attendant upon all cases of chronic dyspepsia, in which the liver is torpid; it is rarely absent as a symptom, except in very nervous excitable subjects. Added to it, we find, in most cases, other corroborative symptoms of the accumulation of carbon, consequent upon impeded hepatic depuration; such as offensive perspiration, dusky skin, high-coloured urine charged with carbonaceous compounds, and in females very dark menstrual discharge; indeed, it would appear as if in these cases of torpid liver, the system made an effort to cast off part of its load by this channel.

26. From a consideration of the history and progress, both public and private, of the epidemic bilious cholera of the summer and autumn of 1846, the proposition was mooted (13),—"that high atmospheric temperature, and the disease British or Bilious Cholera, stand related as cause and effect."—In order to establish this proposition, the effects of long-continued atmospheric heat upon the human constitution, as demonstrated by the latest scientific

¹ Elements of Materia Medica, art. Narcotics.

researches, have been carefully considered, and found to lead to the conclusion, that its principal effect is to facilitate the accumulation of the element carbon in the human system. The effect of this accumulation, has been seen to produce those disorders chiefly of the hepatic and nervous systems, which are symptomatic of the disease. Again, the effects of heat have been compared with those of other agents, even with those of intense cold, known to produce similar phenomena. Proceeding, those cases were next considered in which it was certain the element had actually and directly been introduced into the body. Lastly, those conditions were brought forward, in which, although the element might not really exist in too large proportion in, or be introduced too largely into the body, the means for its removal being deficient, analogous effects were produced; such are the anæmic state, and the position of travellers at great elevations. The symptoms of all having been compared, and found to agree in most of their characteristic features, we are warranted as a conclusion, not only to repeat the proposition, that “high atmospheric temperature and the disease British or Bilious Cholera, stand related as cause and effect,” but also to add to it further, “that heat acts by inducing in the system an accumulation of a noxious or poisonous agent, carbon—the accumulation of which, is not only the cause of the symp-

toms which characterise the initiatory stage of the disease in question, but also of those developed in its more prominent conclusion.” It has been said, however, that heat is but the primary cause, by the same condition, it is a cause removed primarily from under man’s control ; and probably, even under conditions the best regulated, the best observed, the advent of, or exposure to sudden extreme heat, must exert some injurious effect upon many unacclimated constitutions ; it is, however, certain that most of its hurtful influences in the production of disease, depend not on its own intrinsic power, but upon those numerous subordinate agents which originate the evil, and which are called into activity by the power of heat ; agents, however, which are almost entirely under the control of man to remove altogether, or modify greatly. The consideration of these will occupy the next chapter.

CHAPTER III.

SUBORDINATE CAUSES.

28. Influence exerted through Digestive Organs.—29. Arguments supported by Products of different Climates, and by National Customs.—31. Use of Fermented Liquors.—32. Influence exerted through Respiratory Organs.—35. Skin.—37. Recapitulation.

27. HAVING now, it is hoped, clearly demonstrated the proposition, that the symptoms, progress, and phenomena generally of bilious cholera, depend upon the gradual accumulation of Carbon in the human system in some form or condition, and that the accumulation takes place under the influence of atmospheric heat as the primary agent, it remains to examine and consider those minor secondary agencies which mainly invest the primary one with the noxious effects so frequently attending it, but which are by no means necessary adjuncts, further than as they are unregulated and uncontrolled.

28. The channels through which these minor agencies exert their principal influences in the circumstances under consideration, naturally resolve themselves into the three divisions, of the digestive, respiratory, and cutaneous systems. The digestive system first claims attention. Through this the body

is supplied with all its necessary nourishment, with all the pabulum needful for its numerous and varied functions ; and life and health are both dependent on the quality and quantity of the aliment, liquid and solid, thus introduced : in our usually temperate climate of Britain, instinctively almost, and partly too experimentally, we have been led to the use, generally speaking, of that kind of diet most calculated to maintain health, that is, a mixture of animal and vegetable food, with a moderate proportion of stimulant. That this system is right in the main, and that the modes of life adopted in this country by society generally, however susceptible of great improvement, are still in many respects suited to the circumstances, may be concluded from the fact, that “ England holds, in a sanitary point of view, the first place among the more powerful European states.”¹ At certain times, however, and in certain seasons, our ordinary diet and modes of life are not so suitable, more especially in hot weather, and particularly when it attains such continued intensity as during the summer of 1846. At such times, some change in our ordinary habits is required to meet the exigency ; unfortunately, however, the requisite change interferes with the large and often unnecessary consumption of animal food and of stimulants, which has with many become almost second nature,

¹ Dr. Guy's Lecture on Unhealthiness of Towns, p. 6.

and is regarded as one of the main enjoyments and ends of life. The very promptings of Nature might guide to what is proper, for with most, animal food, and rich food, which is generally highly carbonized food, becomes distasteful in hot weather; too frequently, however, the natural appetite is unnaturally excited, stimulated, and pampered to take in the customary proportion of aliment, which, instead of feeding the body, feeds only disease. Precisely similar, and to a precisely similar cause, is owing the mortality of Europeans going to hot climates. "The Englishman in Jamaica sees with regret the disappearance of his appetite, previously a source of frequently recurring enjoyment; and he succeeds by the use of cayenne pepper, and of the most powerful stimulants, in enabling himself to take as much food as he was accustomed to eat at home. But the whole of the carbon thus introduced into the system is not consumed; the temperature of the air is too high, and the oppressive heat does not allow him to increase the number of respirations by active exercise, and thus to proportion the waste to the amount of food taken, disease of some kind therefore ensues."¹ On the other hand, it is notorious, that where Europeans on going to a hot climate, will at once conform to the manners and customs of the native inhabitants of the country, they have a much better

¹ Liebig's Chemical Physiology, p. 23.

chance of preserving health than when they perversely continue the habits of their colder fatherland. Dr. Copland¹ cites the case of an Englishman met by him in 1817, in one of the most unhealthy parts of intertropical Africa, who ascribed his preservation of health solely to his having pursued as closely as possible, the modes of life of the natives. Further illustration of a fact so well known in the annals of climate influences is unnecessary. It is true, that hepatic affections will prevail in these climates in spite of all precautions, but here the exception only proves the rule.

29. The principles here contended for, are particularly well supported by a consideration of the natural products of different climates and countries, which have been provided for the use of their inhabitants by their Creator, and by a review of the consequent customs of the natives of different latitudes. Liebig says, "the fruits on which the natives of the South prefer to feed, do not in the fresh state contain more than 12 per cent. of carbon, while the bacon and train-oil used by the inhabitants of the Arctic regions, contain from 66 to 80 per cent. of carbon." It may here be objected, that the grains, maize and rice are consumed in considerable quantities in hot climates, and that those grains contain much carbon; when,

¹ Dictionary of Practical Medicine, art. Climate.

however, it is remembered, that it is requisite to use water in their preparation for food, and that they possess the property of absorbing this fluid to an extent so great, as almost to assimilate them to the watery fruits, the objection above alluded to will vanish. Some of Dr. Copland's remarks¹ on these subjects are so pertinent, and so nearly coincide with Liebig's, that they cannot be omitted. He says, "the intimate relation which subsists between the food of man, and the nature of the soil and climate which he inhabits, and the combined operation of both upon his constitution, and the character of his diseases, have seldom been considered in a manner deserving of the subject. "Whenever, therefore, the natural history and diseases of man come under consideration, they should be viewed in relation to those productions of the soil on which he subsists." In contradistinction to the case of the Englishman resident in Africa quoted above (28), we are told² that "the Russians who winter on Nova Zembla, according to Dr. Aiken, imitate the Samoides, and eat raw flesh, and drink the blood of the rein-deer, in order to preserve their health in those arctic regions. The Greenlander devours with good appetite the raw flesh of the whale, or the half frozen, or half putrid flesh of seals, and

¹ Dictionary of Practical Medicine, art. Climate.

² Ibid.

drinks the blood of these latter animals, or regales on dry fish and whale oil.” Mr. George Combe,¹ in illustration of the same subject, says, “in the arctic regions no farinaceous food ripens; but on putting the question to Dr. Richardson, how he, accustomed to the bread and vegetables of the temperate regions, was able to endure the pure animal diet, which formed his only support on his expedition to the shores of the Polar Sea, along with Captain Franklin, he replied, that the effect of the extreme dry cold to which he and his companions were constantly exposed, living as they did, in the open air, was to produce a desire for the most stimulating food they could obtain; that bread in such a climate was not only not desired, but comparatively impotent as an article of diet; that pure animal food, and the fatter the better, was the only sustenance that maintained the tone of the corporeal system; but that when it was abundant (and the quantity required was much greater than in milder latitudes), a delightful vigour and buoyancy of mind and body were enjoyed.” How strongly do these facts contrast with the remark of the first quoted author: “The adoption of animal food exclusively, or of too large a proportion of it, disposes the human frame when exposed to the influences of tropical heat, to those diseases which arise from

¹ Constitution of Man.

endemic causes.” We know that in hot climates the animals generally used as food in more temperate regions, are comparatively few in number, and thrive badly ; but we also know that whilst Divine Wisdom has withheld what would be hurtful, there has been superadded an overflowing and increasing vegetable production, in every way suited to the circumstances and constitutional requirements of the residents. Still, however, animal food may be largely consumed, indeed, made the sole article of diet in a temperate climate, if at the same time very active or violent exertion is engaged in. It is related by Captain Head, in his ‘ Journey over the Pampas,’ that whilst making immense exertions, he lived for months together exclusively on beef and water, this being the regular diet of the roamers over these immense plains, who spend most of their time in active exercise on horseback. Thus practically illustrating Liebig’s proposition, that with the carnivora, as with man, when confined to an animal diet, great muscular exertion becomes a matter of necessity, and of course *vice versa*. The abundant use of ghee, or clarified butter, by the Hindoos, seems rather at variance with what has been advanced, for here is a highly-carbonized animal oil ; but, really, if taken immoderately, it is said to produce hepatic affections ; and it is not improbable that used moderately, it

may have a slight aperient effect, thus proving preventive, rather than provocative of disease, resembling in its action the broiled breakfast bacon, which in small quantity is really in this way useful to many liable to hepatic disorder, notwithstanding that at first it appears to be rather an anomalous remedy. The *free* use of bacon, however, during hot weather, cannot be well, and perhaps conjoined with other influences, the bacon diet of the lower orders in England, may tend to assist the formation of the *materies morbi* of bilious cholera in the system, when this state of atmosphere exists. Dr. John Webster says,¹ “that the use of bacon has been prohibited in the South of Europe during hot weather, and that when cholera was prevalent in this country, he has frequently traced its origin to improper food, particularly to bacon.”

30. It is not improbable that the prohibitions of Buddhism in India and Ceylon, against the use of fermented liquors, or the slaughtering of animals for food,² may have had their origin in experimental knowledge of the injurious effect of the free use of these articles of diet in such climates; indeed, probably to some reason of this kind may be traced the interdiction of fermented liquors not only among the Hindoos, and other orientals, but

¹ Medical Gazette, Feb. 24th, 1846.

² Major Forbes, Eleven Years in Ceylon.

among the Moslem nations generally. Alcohol is so nearly allied to the highly-carbonized fats and oils, that there can be no doubt its use in any shape, and to any extent in hot climates or weather, must contribute largely to the excess of carbon in the system. Dr. Peters, in the 'New York Journal of Medicine,' in commenting upon the pathological effects produced by alcohol, observes, "that the most important appearances are the fluid and venous condition of the blood, and the great superabundance of fat. According to Steinheimer and Roesch, alcohol acts directly upon the blood, and drunkenness is owing to an alcoholic venous plethora, in which the proportion of hydrogen and carbon in the blood is much increased."¹ As a natural consequence of these effects, the use of alcoholic liquids, whether in the form of wine, malt liquor, or spirits, increases the necessity for oxygen in a remarkable degree."² Alcohol likewise acts not only directly, but indirectly, for it has been shown by Dr. Prout that it lessens, for some time after its ingestion, the amount of carbonic acid elicited from the system.

31. The above remarks explain sufficiently the different effects exerted upon the body by alcoholic fluids generally under different circumstances. A

¹ Medical Times, Nov. 22d, 1845.

² Ibid. Leader, Dec. 14th, 1844.

much larger amount, for instance, can be taken without any perceptible effect during active exertion in a clear cold air, as any one who has ascended a highland mountain can testify, than when the individual remains inactive in doors; in the latter instance, drowsiness is the most frequent consequence. It is remarkable, however, that this last effect is not nearly so readily developed when the mind and nervous system are in a state of excitement, as, for example, in general company, even though in these circumstances the air must generally be more than ordinarily contaminated. This agrees with the remark made previously (5), that persons of excitable nervous temperament did not so readily, nor to the same extent, suffer from the drowsiness and languid feelings characteristic of the first stage of bilious cholera.

32. It has been said that "if food is the first condition of life, oxygen is the second." We have now, as fully as our subject requires, considered the action and influences of the first upon the human constitution; the consideration of the second leads us to the review of the respiratory and cutaneous functions, as influenced for good or evil by the external relations existing in connexion with them. Of the former of these functions which first engages our attention, it is difficult to overrate the importance, when it is considered that upon its

efficacy depends not only the purification of the whole mass of the blood, and the perfection of the assimilative process by the due inspiration and absorption of oxygen, but also by the necessary and normal excretion of the superfluous carbon and hydrogen, the retention of the former of which has already, it is hoped, been proved to originate the disease under consideration. Dr. Copland¹ says, "it has long been known that affections impeding the functions of the lungs are frequently attended with an increased secretion of bile. This I have shown to depend upon the liver being excited to increased action by the carbonaceous and other elements accumulated in the blood."

33. If, however, the perfection of the respiratory apparatus itself is necessary, no less so is the purity of the atmosphere of which it is the intermediate agent. It has been mentioned (18) how, in hot weather, the supply of vital oxygen is diminished even in a pure atmosphere; how necessary then to remove every possible source from which the diminished supply may be further curtailed, or the place of the life and health-giving element supplied by noxious or poisonous vapours or gases. Fearfully has this necessity been vindicated. It needs not here to tell what has been, and is daily being, brought so strongly before the notice of the public

¹ Dictionary of Practical Medicine.

and of the profession, that fever and cholera most abound in the unventilated, undrained, and filthy dwellings of the poor in our large towns and villages. From dunghills, from cesspools, from choked-up sewers, and such like abominations, are continually evolving the products of decomposition, fetid vapours, and poisonous gases, the latter mainly composed of the compounds of carbon, which not only supplant the purer air, but act directly as poisons themselves, being absorbed into the blood of those who are exposed to them. Although the normal atmosphere contains a minute proportion of carbonic acid, according to Saussure not above 4·15 in 10,000 volumes, under various circumstances that proportion is notably increased. When the atmosphere is but slightly contaminated with carbon, or the exposure temporary, probably the only inconvenience experienced is transient drowsiness or slight headache; when, however, the poison is encountered in a more concentrated form, it proves rapidly fatal, whether that concentration be the result of animal exhalation, as in the well-known case of the Black Hole of Calcutta, or have its origin in the chemical decomposition of decaying organic substances, or of inorganic compounds. The proportion of carbonic acid in the atmosphere which will destroy life has been variously estimated, and probably depends, within certain limits, on collateral circumstances

has been estimated so low as one per cent. Dumas considers that proportion a maximum for safety, and mentions death to have occurred from an atmosphere containing but 3 per cent. It must be remembered, however, that it makes a great difference whether the carbonic acid has been formed at the expense of the oxygen of a confined space, as in the instance of a congregation of individuals, or of burning charcoal, or whether it has merely supplanted an equal bulk of atmospheric air; in the latter case a proportion of about 10 per cent. of carbonic acid is by most authorities considered incompatible with life; and most medical jurists coincide in the opinion that the action is that of a narcotic poison.¹

34. Such are the visible effects of carbonic poisoning which arrest the attention. Far more deadly, are its slow, almost unobserved, effects amid a crowded population, who are regularly drawing in with every inspiration this subtle poison, which is evolved from their own bodies, from every stagnant drop of water or grain of moist filth, even, indeed, from articles which would scarcely be suspected, "damp sawdust or straw slowly extricates carbonic acid."² The rapid destruction of human life, such as happened in the Calcutta Black Hole, or is of such frequent occurrence in consequence of combustion in

¹ Dr. Christison, Dr. Golding Bird, and others.

² Taylor's Medical Jurisprudence, p. 611.

close apartments, creates a sensation of horror; with what comparative coolness is the statement received, that the same agency is at work, destroying thousands every year in this country, pouring out, without exhausting, its venom, on the densely-crowded, the dirtiest, worst-drained, and worst-ventilated portions of our great cities. In a small portion of London¹ the inhabitants are crowded in the proportion of 243,000 to the square mile, and in Liverpool in that of 460,000 to the same space. However injurious such a condition of things may be under ordinary circumstances, when great heat comes upon us the evils undergo terrible aggravation. The expanded air, even in its purity, contains less than its wonted oxygen, whilst everywhere the exhalations of living animal bodies are increased, and the activity of chemical decomposition so stimulated, that every depository of filth or stagnant water pours forth in increased quantity its poisonous gas and vapour. Dr. Hancock observes,² “when tropical heat is added to the influence of marsh effluvia, then we have the various shades of intermittent, remittent, and even continued fever, passing sometimes into each other by almost imperceptible gradations, and complicated more or less with bilious symptoms. When intemperate seasons, deficient and unwhole-

¹ Mr. Grainger's Lectures on Unhealthiness of Towns.

² Art. Endemic Disease, Cyclopædia of Practical Medicine.

some food, and animal filth are superadded to the causes above mentioned, and acting upon a condensed population, the highest grades of pestilential fever are often exhibited." With all the evidence now adduced, with all that which has almost become familiar to the public, it cannot be doubted that man, who, "from his physical and intellectual condition, requires more oxygen in proportion to the area of his lungs than any other animal,"¹ should suffer much when that supply is diminished, and its place occupied by poisonous supplanters. Truly, in the words of Dr. Neil Arnott, "if sources of aerial impurity are allowed to exist in or around dwellings, the people are poisoned;" slowly, to be sure, but not less certainly, does the poisoning go on in the crowded room, in the unventilated alley, in the unsewered dwelling, as in the close apartment filled with charcoal fumes. Surely no further demonstration is required to point out, how greatly, an atmosphere weakened in its oxygenating power, contaminated by noxious ingredients which supply the very *materies morbi*, must assist in the formation of that state of system which ends in an attack of bilious cholera; neither can it be less evident, the share which, in the present neglected state of sanitary things, every hot summer, and especially such

¹ Medical Times, Leader, Dec. 14th, 1846.

an one as that of 1846, must have in developing the evil.

35. The close affinity between the functions of the lungs and skin renders many of the illustrations, especially such as relate to the purity of the atmosphere, applicable equally to both, these therefore need not be repeated. We have from the skin the same exhalation of carbonic acid and watery vapour, the same absorption not only of oxygen, but also of deleterious gases. Collard de Martignay has more especially shown "that when an animal is enveloped by an atmosphere of carbonic acid, the access of atmospherical air to the lungs being still permitted so as to maintain ordinary respiration, death, if the experiment be continued sufficiently long, is the invariable consequence." There is, however, this essential difference between the lungs and skin, that much of the efficiency of the latter depends upon the individual himself, and when we consider the immense extent of this organ, so to speak, its abundant supply of blood-vessels and nerves, its important atmospheric functions, and its wonderful power of compensating for deficient action in internal organs, we can scarcely rate too highly the importance of keeping it in an unimpeded state, nor can we be surprised that neglect of this most important portion of the human frame should encourage disease, and especially the disease of which we are now

treating. Dr. C. Searle, in a paper on *The Effects of Heat in India*,¹ says, "that health in India is very generally observed to be in proportion to the active state of the skin, and freedom of perspiration." Some experiments performed by M. Fourcault, very forcibly demonstrate the effect of obstructing the cutaneous transpiration, and the evils thereby entailed upon the system generally, and the blood in particular. These experiments consisted in coating the skins of animals of various kinds wholly or partially with varnish, so as entirely to stop the cutaneous functions: amid numerous effects observed to be produced by this process, are enumerated venous congestions, especially of the liver." A curious result followed the partial application of an impermeable coating; "if, for example, one half the body only was covered, the capillaries on the inner surface of the skin of that half were found to be distended with a dark fluid blood, highly venous, while the capillaries of the skin not covered by the coating contained red blood, and much less of it."²

It is a recorded fact, that a child, the skin of which had been covered with gold leaf, in order to fit it for a part in some of the ceremonies of the Romish Church, died in the course of a few hours in consequence of the gilding.

¹ *Lancet*, Dec. 4th, 1841.

² *Ext. British and Foreign Medical Review*, July 1845.

36. The importance of preserving the skin in a free state we find to be duly recognised among the inhabitants of nearly all warm climates, and frequent ablution much practised. We are told by Wilkinson that even the ancient Egyptians, who paid perhaps more attention to health and sanitary regulations than many modern nations, certainly more than their modern descendants, were very particular in their ablutions, and generally preferred cold water.

So great indeed is the importance of this subject, that we find it incorporated with the religious codes of most nations of southern climes. And yet it is strange to what an extent the cleansing of the skin is neglected in this country ; many who would consider themselves insulted by their cleanliness being doubted, pass on from day to day, and from week to week, allowing the skin to be caked over with the debris of each succeeding perspiration. Can we wonder that disease comes ? Should we not rather wonder that it does not come oftener ? Surely the neglected skin, with its obstructed and impeded functions, carbonic and lactic acids retained, oxygen unabsorbed, must add one more to the list of carbon accumulators, one more *fons et origo* to the sources of bilious cholera.

37. From the Report of the Registrar-General, considered at the commencement of this treatise, it was found that the quarter ending September 30th,

of the year 1846, presented an average range of temperature, higher by six degrees than the corresponding quarter in 1845, and from the same source, we learned that coincident with this high range of temperature, there occurred a striking increase of mortality throughout England; that, in some large towns containing a crowded population, the deaths were nearly double the usual average, and further, that this increased mortality was owing principally to diseases connected with the hepatic system, and especially to that form of disease to which the name of bilious or British cholera is usually applied. The history of this disease as noticed in private practice was then traced, and its commencement carried back to the first initiatory symptoms of disorder in the constitution. The public record and the private history brought us to the conclusion that intense and long-continued heat was the primary cause of the epidemic. The effects and *modus operandi* of this agent upon the constitution were then considered, especially in connexion with animal temperature, and according to the latest demonstrations of modern science, it was seen that intense heat, even under favorable circumstances, and especially when preventive measures were not adopted, tended to facilitate the accumulation of carbon in the system, and that to the presence of this element in some form or con-

dition, were owing the phenomena of the disease in question ; similar phenomena were, moreover, found to result in those instances in which there existed certain assurance of the superabundant accumulation of the element, such as by its direct introduction into the human body in the cases of poisoning by charcoal fumes, &c.

38. Passing from the direct results of heat, its indirect agency, exerted through the digestive, respiratory, and cutaneous functions of the human frame, were next considered. With regard to the first of these more particularly, reference was made to the ordering of Divine Providence in the natural productions provided for the use of the inhabitants of various climates, and the manners, customs, and food of different nations, and their influences upon health were examined. It was seen that the food of the Greenlander must necessarily be animal, the fatter, or in scientific language the more highly carbonized, the better, and that stimulants could be taken largely without any apparent effect ; that, on the contrary, the Hindoo or the African must subsist, and could only maintain health on the farinaceous and watery fruits of their climates. Passing from the digestive function to the respiratory, the researches of the zealous advocates of sanitary reform gave us their aid in demonstrating, how greatly, directly and indirectly, a contaminated atmosphere fed the source

of hepatic disorder. Lastly, the great cutaneous covering of the body claimed our attention, and from the experimental researches of physiology, and from national customs, we learned the importance of maintaining its freedom from obstruction, and of preserving its cleanliness, especially in hot weather and climates. In addition to all these evidences, we find that the most salutary of the customs and habits have been embodied in the religious codes, especially of southern and oriental nations, no doubt with a view to their more certain observance,—but still a blind observance. Now, however, we can point to the accumulating and daily increasing evidences of modern science, which not only lends its approving voice to many of the laborious or painfully wrought-out conclusions of unassisted experience, but leads us by pleasanter and more direct paths to the truth, and to its practical application. To science is trusted the confirmation of the arguments of the previous pages, in which it is hoped enough has been said to warrant the conclusion—That atmospheric heat as the primary cause, neglected dietetics, imperfect ventilation and filth, as the secondary agents, are the principal sources from whence arise those epidemic diseases of summer and autumn in Britain, which are connected more especially with the hepatic system. That one of the most frequent, distressing, and fatal of these diseases is the Bilious or British Cholera—a

disease which, in the majority of cases, might be entirely prevented by the adoption of proper precautionary measures ; and that the commencement of that disordered state of the bodily functions, which constitutes the first stage of the disease, and which invariably precedes the crisis of vomiting and purging, is marked by such constant and well-defined symptoms, that proper and early attention to the warning, might at all times prevent any further progress, and spare the patient the distress and danger of the inevitable conclusion.

CHAPTER IV.

TREATMENT.

39. Preventive Treatment ; Dietetic.—42. Ventilation and Cleanliness.—44. Initiatory stage ; Treatment.—46. Cases ; Secondary stage ; Treatment.—47. Aggravated Cases ; Treatment.—48. Cases and Observations ; Stage of Febrile Hepatic Irritation ; Treatment.

39. HOWEVER valuable may be the science which enables us to relieve the sufferings or cure the diseases of our fellow-men, still more to be prized is that knowledge, which, discovering the causes from which those diseases originate, opens at the same time the way for the removal of both. It has been shown in the preceding pages, that the origin of British cholera is traceable first to heat, as the primary exciting cause ; and, secondly, to a number of subordinate agents, which are called into activity by the former, especially when in excess. The first cause we cannot control, whether exposed to its potency under the summer sun of England, or on the plains of Africa or Hindostan ; we may, however, shield ourselves from its influence, and by so regulating our actions and our external relations, in accordance with those organic laws of the world around us,

which have been opened up to the intelligence and industry of man, reap only the blessings of that pure gift of God which brings to perfection the fruits of the earth, instead of converting it into a curse by our ignorance or carelessness. It has been shown that, in a hot atmosphere, the system does not require the same amount of carbonized material for the sustenance of its animal temperature as in a cold one; and that even if the material is introduced, the atmosphere is so modified as to be incapable of consuming it, that disease consequently must result; the demonstrated cause naturally indicates the escape from the evil: the supply of carbon introduced into the body in the form of food must be diminished.

40. Before the researches of organic chemistry told men how much of this or how much of that element different articles of human food contained, the regulation of diet could not be maintained with the same confidence now offered; still, however, man was not without a guide: he had the dictates of natural appetite, which in hot weather generally loathes highly-carbonized food in any quantity, and seeks that in which the watery elements predominate; he had also before him the wise arrangements of Providence with respect to the natural productions of hot climates (29), and the customs of their inhabitants. Modern science has confirmed these

natural demonstrations, and man points to the grains, the watery fruits, and light food of every kind, as the most fitting, as it is likewise the most grateful diet, for those exposed to atmospheric heat, at the same time offering proof as clear as mathematical demonstration of the reason why; and *vice versâ*, telling us that the consumption in cold climates of large quantities of animal food, and especially of animal oils and fats, is the only system by which life could be maintained in these regions of intense cold; in fact, by no system of diet, could carbon, fuel for the preservation of animal heat, be so largely and perfectly supplied to the body. And here it is well to notice how much injury has resulted from mistaken ideas respecting the cause and nature of British cholera, and its confusion with other forms of diarrhœa,—ideas which, in condemning the use of fruit even in moderation during summer and autumn, have excluded one of the means so opportunely and abundantly supplied by Providence, as most calculated to preserve health, and indeed avert the dreaded disease. The value of fruit or herbaceous aliment generally in the treatment of hepatic affection is thus noticed by Dr. Dick. He says: “In the biliary complications of dyspepsia, an herbaceous and acidulous diet is peculiarly indicated. This is the opinion, founded on experience, of Andral, and several

¹ Medical Gazette, March 27th, 1846.

other eminent physicians, and my own observations have amply corroborated its truth.”—“Under the term herbaceous aliment, I include, among other things, grapes, apples, pears, strawberries, pomegranates, &c.”—“Various nervous symptoms will vanish under its (herbaceous aliment) employment: an unwonted vigour and freshness is felt, and the state of the stomach and bowels is sensibly improved.”

41. As soon as any individual is permanently exposed to the influence of a hotter atmosphere than usual, his consumption of animal food ought to be very much reduced, meat taken moderately once a day is sufficient, unless under particular indications; and probably many would best consult their enjoyment of health under such circumstances by occasionally omitting its use altogether for a day at a time, and most certainly by abstaining entirely in the event of any of the symptoms of approaching disease manifesting themselves. Articles of diet containing much fat or oil, such as bacon, butter, cream, pastry, &c., should be taken very sparingly; the place of the forbidden compounds of carbon being supplied by fruits, vegetables, and farinaceous preparations. There are very few persons who cannot take with impunity, and even with benefit, the ripe subacid fruits, and lighter vegetables.¹ Fruit fre-

¹ It may here be well to mention the propriety of avoiding as articles of diet either peas or beans, unless quite young. As these

quently disagrees from being taken, not as an article of diet, but as a supernumerary, after a heavy and mixed meal, especially after dinner. It is most wholesome when eaten early in the day, along with farinaceous preparations, as bread or biscuit. With respect to drink, those whose constitutions admit of it, certainly cannot do better than abstain entirely from alcoholic stimulants. In the country, with free air, sufficient food, and healthful active occupation, the labourer would be far more likely to preserve health and strength by drinking water only, instead of the wretched beer which is consumed in such large quantities.¹ But, although individuals of strong natural nervous power and force of constitution, in any situation, and especially in the country, may do well on the water system, we cannot perhaps expect it to be followed by all ; hereditary constitution, habit, and the debilitating influences of crowded cities and their modes of life, with the wearing-down anxieties of life's battle, alike forbid the disuse of

vegetables approach their full size, the seed coverings become so tough as to resist the action of the gastric juice, and, passing into the bowels unchanged, are very apt to lodge in the sacculi of the colon, remaining sometimes for weeks, causing spasmodic pain, with troublesome diarrhœa, which, but for the absence of other symptoms, might be mistaken for bilious cholera. All the symptoms are quickly removed by a dose of castor oil, which carries off the offending matter.

¹ The beer, however, is much more injurious to the kidneys, in consequence of its causing a superabundance of lithates, than to the liver.

this provision for civilized man, although his abuse of the blessing has too often converted it into a curse. If undiluted spirits are ever admissible, it certainly is not during heat, when they are most hurtful, not only from their direct heating effect, but from their highly-carbonized constitution, and interference with the excretory functions of carbon. As a rule, the stimulants of hot weather ought to be taken in a state of great dilution ; the light porter and pale bitter ale manufactured for India are, perhaps, the most wholesome beverages amongst the class of malt preparations, and of the wines the lighter sorts are preferable for use during extreme heat. In addition to dietetic precaution, most persons will be the better of taking, occasionally, during the continuance of hot weather, some gentle aperient, and no form is more suitable than the *Pil. Rhei comp.*, combined with a small proportion of *Pil. Hydrarg.*, or, if required, with calomel ; following these up with a saline draught.

42. What has been said respecting the influence of a contaminated atmosphere in producing that state of system which constitutes bilious cholera, renders it almost superfluous again to insist upon the necessity of preserving aerial purity by ventilation, &c. &c., as a means of preventing epidemic disease, and it is needless to reiterate the numberless facts in proof, of which no medical man can be ignorant,

and which have almost become familiar to the public ; it may, however, be here noticed, that whilst the origination of diseases in consequence of deficient ventilation, decomposing organic matter, or emanations from the sick, is generally attributed to some undetectible form of malaria ; our argument traces the direct action of the weakened and contaminated air upon the system : this tangible agent is perhaps more appreciable by people generally than an unknown something, and no medical man can be rightly performing his duties to his patients or the public, who does not, when anything like epidemic or endemic disease arises, immediately investigate the causes, and exert himself to procure their removal, while at the same time he endeavours to impress upon the minds of the ignorant, the reasons for, and importance of, sanitary measures.¹ Without waiting, however, for epidemic disorder, the influence of unsuspected

¹ A striking instance of the evils attendant upon neglect of these measures happened lately in the practice of the writer. In one corner of a small agricultural village, there occurred in spring as many as sixteen cases of fever ; the cause, a large, open, filthy drain, which ran, or rather stagnated, close to the doors of the cottages. After some trouble this drain was covered in, and the village remained tolerably healthy until autumn, when an epidemic of measles attacked the children ; there were probably fifty cases, and out of the number four deaths occurred. The fatal cases all took place within twenty yards of each other, and were chiefly characterized by extreme pulmonary congestion ; of the remaining cases in other parts of the village scarcely any were dangerous, and most were unusually mild. In one house in which two of the children died there was found a neglected, choked-up sewer, and be-

atmospheric contamination may be traced in the course and symptoms of most diseases which happen within its sphere, and the cause should be searched for accordingly.

43. The close and crowded sleeping-rooms in the cottages of the poor in the country, certainly contribute greatly to the formation of disease in those who during the day, enjoy wholesome air, and it is to be feared that this cause is powerfully assisted by the neglect of personal cleanliness, such as want of attention to regular washing of the skin, and long wearing of under clothing, even where an abundant supply of water exists. The sin is one of ignorance. These observations cannot be better concluded than in the words of Dr. Arnott, who "states, as the result of his experience, that the immediate and chief cause of many of the diseases which impair the bodily and mental health of the people, and bring a considerable proportion prematurely to the grave, is the poison of atmospheric impurity, arising from the causes explained, as existing in and around their dwellings."¹ Respecting exercise, it has been shown how it acts in purifying the blood by increasing respiration (29); during hot weather, it is most beneficially taken in

fore the door a soil-heap, both of which stank badly. Before the door of a second house ran a very filthy open drain; close to the door of the third was a cesspool, unopened for years, and from which the gas might be seen bubbling up through the water that covered it.

¹ Dr. Guy's Lecture on Health of Towns, p. 24.

the earlier parts of the day, the meridian heat being avoided.

44. When symptoms of the initiatory stage of British cholera have attacked any individual, they may often be banished by simply reducing and regulating the diet, at least, in slight cases. More generally, however, medicine is required, and then a mercurial given at night, combined with conium or hyoscyamus, to prevent griping, is most suitable. No direct aperient should be added to the mercurial, so as to allow of its exerting its whole effect unembarrassed upon the liver. The unfailing effect of this treatment is to produce a very copious discharge of ill-conditioned acrid bile, which causes sometimes so great action of the bowels, and so much pain as to call for interference.¹ The day following the administration of the mercurial, one or two doses of potassa, in combination with colchicum, and perhaps taraxacum, will be found of much service. Treated on these principles, the disease is easily and quickly relieved; the measures should be persevered with till all the symptoms are removed, and till the motions assume a healthy character. If the stomach remains weak, and the appetite bad, some bitter infusion may be given, or if the tongue be clean, nitric acid in *Infus. Taraxaci*. The following cases

¹ It is well to warn the patient of the probable effect of the mercurial, and the reason, otherwise the medicine may be blamed unjustly.

will not only illustrate the treatment, but also many of our former remarks.

CASE I.—Mrs. H., æt. 50, seen July 22d, 1846. Temperament, sanguineo-lymphatic, hair, eyes, and complexion, light. Complains of general indisposition, giddiness, and headache; pain up the neck and back of head. Extreme drowsiness at all times, but especially after meals. Tongue partly coated with yellow fur, mouth very dry after sleep, frequent saltish eructations, feels sickly, but appetite tolerable. Diarrhœa, preceded by tormina across the arch of the colon, occurs after taking food. Urine deposits a brown sediment (urate of ammonia); frequent perspirations.

R. Calomelanos, gr. iv
 Ext. hyoscyam. gr. v.
 Divid. in pil. iv, sumat ij hora somni.

R. Potass. carb. ʒj
 Vini colchici, ʒij
 Spt. eth. nit. ʒss
 Aq. q. s. ft. mist. ʒviij.
 Sumat. 6tam partem ter die.

Diet plain and light.

July 24th. Medicine has acted powerfully, with much griping, and smarting of the anus from the passage of numerous very dark bilious stools. Feels much better.

Continue mixture.

R. Hydr. c. cret. gr. x

Ext. conii, gr. xij.

Fiant pil. vj. ij omni nocte.

26th. Much better in every way; has rested well; mouth still very disagreeable after sleep, no thirst, appetite improved; pain between shoulders and up the back of neck gone; bowels open; urine clear. Sleepiness has quite disappeared; tongue nearly clean. Continue.

28th. Much better; sleeps well; no drowsiness, digestion good; urine plentiful, clear, and light-coloured; motions natural; is free from pain.

R. Acid. nitric. dil. ℥ij

Spt. eth. nit. ℥ss

Tinct. aurantii, ℥ss

Infus. gentian. q. s. ut ft. mist. ℥vii.

Sumat. 6tam partem bis die.

Sumat. pil. rhei. comp. c. hydrarg. ij omni noct.

Diet plain.

August 1st. Quite well.

CASE II.—Mrs. P., æt. 61, widow, seen July 23d, 1846. Temperament, nervous bilious. Hair, eyes, and complexion dark. Generally enjoys good health. Has felt very unwell since the hot weather commenced. Complains of giddiness and pain at the back of the head; is very drowsy, says she “could sleep day and night.” Tongue furred, yellowish; appetite pretty good, but feels swelled and uncomfortable after eating; eructations of bitter

yellow fluid ; pain between the shoulders, and up the back of the neck, extending to the head ; painful feeling of fulness in the hypochondria ; bowels confined ; urine not observed. Pulse 72 ; breathing at times short ; general feeling of weakness and lassitude.

Diet to be light and plain, avoiding all animal food.

R. Calomelanos, gr. vj

Ext. hyoscyami, gr. v.

Fiant pil. iv, sumat. ij hora somni o. n.

R. Potass. carb. 3j

Spt. eth. nit. 3v

Vin. colchici, 3ij

Aq. ʒvij.

Sumat. 6tam partem ter die.

The medicine producing copious bilious evacuations, as in the last case, the patient quickly recovered.

CASE III.—Alexander W., æt. 40, seen July 29th, 1846. Temperament, bilious ; hair and eyes black ; complexion dark. Felt poorly for ten days. Head-ache and great drowsiness, “ could go to sleep as he walks along.” Appetite bad ; tongue much furred ; painful sense of fulness in hypochondria, and pain between the shoulders ; bowels confined. Urine clear when passed, depositing on standing, urate of ammonia, and rhombic uric-acid crystals ; Sp. g: 1·029. Feels weak and languid.

R. Pulv. ipecac. ʒj.
 Sit. pulv. emet. statim sumend.
 R. Calomelanos
 Ext. hyoscyam. āā gr. iv.
 Fiant pil. ij hora somn. sumend.
 R. Potass. carb. 3j
 Vin. colchici, ʒij
 Spt. eth. nit. ℥ss
 Aq. q. s. ut ft. mist. ℥viiij.
 Sumat. 6tam partem ter die.

Diet plain, no meat, or fatty matter.

31st. Medicine has acted very freely, motions at first very dark, subsequently lighter in colour; drowsiness gone, appetite improved. Urine clearer, and lighter in colour, &c.

This case recovered in a few days, under a treatment similar to that employed in the other cases recorded.

45. When the concluding stage of bilious cholera—the vomiting and purging—has set in, it becomes a question how far it is well to interfere. If the vomiting is moderate, unattended with distress, and the diarrhœa mild, medicine is scarcely required; the retching may be rendered more easy by draughts of tepid water, and the bowels soothed and protected from the irritation of acrid bile, by the free use of gruel, barley-water, or of gelatine, or isinglass in solution. It is better not to attempt to give mercurials during the attack; they can do no

good ; the acrid bile is flowing away as fast, perhaps faster than need be, and these medicines by stimulating the liver, only add to the distress. When the violence of the attack has subsided, if the system does not appear to be fully relieved, which probably it may not, measures may then be taken for completing the work which has been commenced. The case having, in fact, assumed the characters of the initiatory stage, the indications for treatment will be similar.

46. A great majority, however, of the cases of British Cholera call urgently for relief, from their painfully distressing character ; even in these, however, the endeavour must be to mitigate the attack, not to stop it, and to protect the system from harm. There is a certain amount of morbid matter to be got rid of, the object should be to conduct it out with as little damage to the patient as possible. If the vomiting is violent and distressing, it may be moderated by doses of *Solut. magnes. bicarb.*, or of some saline effervescing medicine, containing quantities suitable to the case, of *Acid. hydrocyanic.*, or of opium, in some form, the *Liq. opii sedat.* is perhaps the best ; if there is much depression, add ammonia, or stronger stimulants still. If vomiting is not present, or if it has been subdued, and if the purging is excessive, or any sign of muco-enterite come on, there is no medicine which can be given with such never-failing success as castor oil in the

form of emulsion, made with the yelk of egg and distilled water, simple or aromatic, and combined with opium. (The addition of creasote to this mixture will sometimes enable even an irritable stomach to retain it.) This medicine moderates without stopping the purging, and at the same time greatly relieves the pain and spasm ; if it cannot be taken, aromatic confection, or chalk mixture with opium, is the best substitute. In addition to medicinal remedies, however, there are others, from the judicious employment of which, much and immediate relief may be obtained, such as the application over the bowels of large bags of very hot, slightly moist bran, and friction to the limbs, if cramp occurs. When the violence of the attack has been subdued, there is more leisure for the employment of medicine calculated to free the system from any remains of the disease. It must be remembered, however, that after these severe attacks, there is generally, at first, left a considerable amount of irritability of the stomach and bowels, and that doses which would be gentle at another time, may now act with violence. With this precaution, the same principles of treatment may be employed as have been recommended in the premonitory or milder stages of the malady. Sometimes, however, cases occur, in which laxity of fibre, or some peculiarity of constitution, disposes the bowels to remain in an atonic state, diarrhœa continues after the attack has

subsided. This affection will generally be quickly corrected by the administration of some of the vegetable tonics or astringents, or, if necessary, by one or two doses of acetate of lead.

47. In the most aggravated forms of British Cholera, which simulate the Asiatic disease,¹ the attention is first demanded by the depressed and collapsed state of the system, by the cramps, and copious and distressing purging of "rice-water" stools. Opium must here be the sheet-anchor; when it is rejected in its liquid form, it is more likely to be retained in the form of a small pill; stimulants, hot brandy and water, ether, or ammonia may be required, and opiate enemata by the anus. Mustard cataplasms to the spine and abdomen are very useful, and hot external applications wherever they can be placed. When the stomach is somewhat tranquilized, much benefit may be derived from the frequent administration of small quantities of gelatine or isinglass in any appropriate menstruum. By the above treatment the case will generally be resolved into one of the simpler forms of the disease, and may then be treated accordingly. The feverish reaction which sometimes succeeds these severe attacks must of course have its own appropriate treatment. The details of the following cases will illustrate the foregoing observations.

¹ Vide Case VIII.

CASE V.—Joseph B., æt. 50, seen September the 24th, 1846. Temperament, nervous-sanguine. Has not been as well as usual for some time, having suffered from headache, impaired appetite, furred tongue, general lassitude, and insuperable drowsiness; says he has difficulty in keeping awake even during his meals; was seized on the morning of the 23d with severe colicky pain in the abdomen, followed by severe and incessant purging. For this attack various remedies had been administered without affording much relief.

24th, 8 p. m. Incessant purging, with tenesmus and bloody stools, slight headache, thirst; tongue brownish, furred posteriorly; urine high coloured; pulse 80.

Diet. Gruel and farinaceous preparations, with a little mutton tea.

R. Ol. ricini, ℥j
 Vitell. ovi unius
 Aq. destill. q. s. ut ft. emuls. ℥viij.
 Adde. Ol. cassiæ, gtt. viij
 Tinct. opii, 3ss.
 Sumat. coch. amp. ij 4tis horis.

26th. Very much better; has passed two very good nights; bowels have acted only once this morning, and naturally; appetite improved; thirst gone; no pain; tongue clean.

R. Spt. ammon. comp. 3ij
 Tinct. aurantii, ℥ss
 Mist. cretac. ℥vij 3ij. M.
 Sumat. 6tam partem bis die.

R. Pil. hydrarg. gr. j
Pil. rhei comp. gr. ij.
Ft. pil. si opus sit sumenda.

28th. Perfectly well.

CASE VI.— — B—, æt. 6; a thin delicate child. Temperament mixed.

September 4th, 1846, 10 a. m. Was seized, 24 hours ago, with vomiting of bitter yellow fluid, and with purging, motions at first dark, afterwards lighter; great abdominal pain. When first seen, there had just occurred a convulsion, which was followed by extreme exhaustion; head hot, and mind wandering; sickness had stopped. Tongue covered with thick, white, creamy fur, red at tip and edges; purging incessant, motions consisting chiefly of gelatinous mucus, blood, and membranous shreds. Pulse 130, very small, almost imperceptible; general surface cold. A little brandy and water was given immediately, the patient put in a warm bath, and on coming out hot bran applied to feet and abdomen.

R. Confect. aromat. gr. x
Pulv. Doveri, gr. ij.
Sit pulv. statim sumend. repet. post horam.

12 noon. Better; warm; purging still continues; pulse 130, but more defined.

R. Ol. ricin. ℥ss
Vitell. ovi unius
Aq. anisi q. s. ut ft. emuls. ℥ij
Sumat. cochleare 1 3tiis horis.

R. Pulv. Dover. gr. vj
Divid. in chart. iv. 1 6tis horis.
Statim exhib. enema sequent.
R. Tinct. opii, gtt. v
Pulment. ℥j. Ft. enema.
Two leeches to the abdomen.

Diet. Milk and water, containing isinglass in solution.

September 6th. Passed a restless night, with much delirium; is now sensible. Head and skin hot; tongue as yesterday; purging continues.

Contin. mist. et pulv.

Diet the same.

7th. Rested well and quietly, and is better; purging much abated, motions more natural; skin cool; pulse 80; takes a little food.

Continue the same treatment.

9th. Much better in every way.

Continue.

14th. Perfectly well.

CASE VII.—Thomas —, æt. 65, a hale old man; visited September 7th, 1846. Had not been well for some time previous to the present attack; having suffered from extreme drowsiness, impaired appetite, mouth dry and disagreeable in the morning on waking; pain between the shoulders, sensation of fulness at epigastrium, and in hypochondria, especially after eating; urine high coloured. During the preceding

night was seized with vomiting of yellow bilious fluid, severe pain in the bowels, and incessant purging, cramp in the limbs, commencing in the toes, and extending upwards; skin cold. At the time of the visit these symptoms still continued, though modified; tongue coated with moist yellowish fur; pulse 80, very small. This case recovered in a few days, under treatment precisely similar to that employed in the cases already detailed.

CASE VIII.—*British Cholera simulating Asiatic Cholera.*—September 17th, 1846. William B—, æt. 56. Temperament—nervous, bilious; habit spare; hair and eyes dark. After feeling unwell previously, was affected on the morning of the 16th with purging, which continued during the day, but without occasioning much distress; in the afternoon of the same day, sickness came on; in the evening some rhubarb was given him in brandy, and immediately after he was seized with severe cramp, which continued to recur incessantly, till the time of his being visited.

17th, 3 a.m. Great prostration of strength, constant retching, without getting anything up, incessant purging of copious liquid stools, of a peculiar caseous smell, and resembling thin gruel in appearance; cramps frequent and distressing, commencing at the toes, and passing upwards to the abdomen. Thirst intense; pulse 100, weak; skin cold, moist; tongue

covered with white creamy-looking fur ; little or no urine passed ; feet cold. Bags of hot bran were applied all over the body, and the thirst gratified with copious draughts of hot thin gruel.

R. Mist. cretac. ℥viii

Liq. opii sedativ. ℥j

Acid. hydroc. (Scheele) gtt. xv.

Sumat. 6tam partem secunda quaque hora.

11 a. m. Much relieved. Cramps have ceased ; has vomited three times a liquid smelling like the stools, but browner in colour ; purging abated ; less thirst ; no particular pain. Has passed about one ounce and a half of high-coloured urine, loaded with urate of ammonia ; tongue covered with white fur ; skin warm, moist ; pulse 80, soft.

Repet. mist.

Sumat. 6tam partem 5nqua quaque hora.

Continue treatment.

It is needless to go further with an account of the treatment ; the case having now been reduced to one of the milder forms, was treated accordingly, and reported perfectly well on the 25th of the month.

Before taking leave of these cases, it may be well to direct attention to the circumstance of the well-defined initiatory stage, which, in conjunction with other numerous and constant symptoms, was invariably characterized by that strong tendency to drowsiness which has been so often noticed in these pages

as peculiarly characteristic of the disease in question in its first advances, and to the immediate disappearance of the symptom, as soon as the system was unladen by the free and copious discharge of bile, whether produced by a mercurial or by natural effort. With respect to the severe cases of the disease recorded, a few observations are called for. In Case VI, that of a delicate child of six years old, we find, instead of cramps, a convulsion, proceeding either from reflected irritation acting upon the nervous centres, or from exhaustion. Further, we find the disease running on to a state of muc-enterite, or what might be called dysentery, did that disease consist only of a form of inflammation of the colonic membrane.¹

Case VIII is undoubtedly one of those severe cases of British Cholera, which are frequently reported as sporadic cases of the Asiatic disease, and which, during the prevalence of the latter, would be ranked among the cures. The peculiarities in the case worthy of notice, are the non-occurrence of cramps till nearly twelve hours after the commencement of the purging, and the rapid recovery of the patient, without undergoing the stage of "choleric" fever,

¹ Copland says, "cholera may lapse into dysentery." If the views of the latter disease unfolded by the investigations of Dr. Parkes, and published by him in his work on 'The Dysentery and Hepatitis of India,' be correct, cholera can scarce lapse into true dysentery, although the two diseases may be associated.

which is insisted on by many as a necessary sequela to the cold stage of Asiatic Cholera, and as one of the distinctions from the British.

48. A class of cases has been referred to which occurred chiefly towards the close of the epidemic of 1846, in which the liver not having been relieved of its load either naturally or by medicine, symptoms of subacute inflammation, or at least irritation of the organ supervened. In these cases, leeches, cupping, counter-irritation over the seat of the disorder, afforded much relief, and the cure was quickly effected by a course of alkalies, diaphoretics, and gentle mercurials, the doses given three or four times in the twenty-four hours, the diet being of course properly reduced and regulated.

CHAPTER V.

COMPARISON WITH SIMILAR AFFECTIONS, ESPECIALLY WITH ASIATIC CHOLERA.

19. BEFORE entering into a comparison between the British Cholera and its Asiatic prototype, it may be well briefly to review the affections of the alimentary canal which most nearly resemble the former disease. These affections are diarrhœa in some of its forms, dysentery, and irritant (especially arsenical) poisoning.

With respect to diarrhœa, the bilious variety, which so generally appears in summer and autumn, can only be considered as one of the mildest forms of the concluding stage of British Cholera, arising from precisely similar causes, and preceded by the same initiatory stage; it occurs in every degree, from the slightest looseness of the bowels, to the severest form of Bilious Cholera, the intensity of the attack being dependent upon the amount and acridity of the bile, and the rapidity with which it is discharged from the overloaded system. Very different in its nature and causes from bilious diarrhœa is the diarrhœa of irritation (*diarrhœa crapulosa*), which has been noticed above, as arising from the presence of irritating

matters lodged in the bowels. This diarrhœa may occur at all times of the year, but as one very frequent cause of it is the arrest in the folds of the colon, of the seed coverings of peas and beans, which have resisted the action of the gastric juice, it very commonly shows itself in summer. It is usually characterized by pain referred to some one spot in the course of the colon, and by frequent and ineffectual action of the bowels, the tongue being at the same time slightly loaded ; none of the symptoms, however, constitutional or otherwise, are present as they occur in the bilious disease, provided of course that the two disorders are not mixed up together, which they certainly may be. Of course whatever irritates the mucous coat of the bowels may cause this form of diarrhœa, and we find it occurring after the use of fruit when unripe, or in a state of decay, or after its abuse, even when wholesome, or, indeed, frequently following the ingestion of any kind of irritating food. There is, however, one point of difference worthy of notice between the effect of acrid ingesta, and of such mere mechanical irritants as the seed coverings above mentioned, or other things of a like nature :¹ the former, in consequence of their acidity, act in some measure as purgatives, and cure the disorder they occasion by causing their own expulsion ; the

¹ Raisin skins frequently cause this diarrhœa in children.

latter, from their merely mechanical properties, produce just sufficient irritation to be troublesome, but not enough to carry themselves away, consequently, some aperient is required for this purpose, and quickly effects a cure; perhaps the best is castor oil. There yet remains for notice one other form of diarrhœa, which, though generally occurring at the same period of the year as Bilious Cholera, could scarcely be confounded with it; the form referred to is the nervous diarrhœa caused in many persons by the electrical excitement of the atmosphere, consequent upon the approach or presence of thunder. This and the diarrhœa resulting from mental emotion are perhaps the only forms of the disease entitled to be classed with the Neuroses.

50. With respect to any resemblance between the symptoms of British Cholera and acute dysentery, it should be borne in mind how rare is the occurrence of the latter disease, especially in an epidemic form, in Britain, when compared with the frequency of the former. If any doubt exist, the presence of those symptoms already detailed as characteristic of the initiatory stage of Bilious Cholera, or, on the contrary, the febrile commencement of dysentery, will assist the diagnosis. Any ground of discrimination based upon the relative duration of the two diseases is of course liable to fallacy.¹ If Bilious

¹ Cyclopædia of Practical Medicine, art. Dysentery.

Cholera is generally much more rapid in its progress than dysentery, sometimes it is not so ; and it is in these long-continued cases, that the symptoms, in consequence of the occurrence of muco-enteritis, come to resemble most closely the dysenteric affection, tenesmus is developed equally in both diseases under these circumstances : the absence or presence of vomiting, of bile in the motions, of cramps, &c., are all liable to fallacy taken singly, however valuable when combined. The possible complication of the two diseases must not be forgot.

51. The resemblance between the effects produced by many irritant poisons, and the symptoms of Bilious Cholera, must always be considered worthy of much attention : mistakes have been committed, the diagnosis is often difficult, and it should not be forgot, that a poisoner might take advantage of the prevalence of epidemic Bilious Cholera to execute his purpose. Medical jurists seem to have been at some loss for positive distinctive symptoms between the two affections. Mr. Taylor says,¹ “The rules recommended for forming a diagnosis, as they are laid down by the best writers on toxicology, do not appear to be very satisfactory. Perhaps the following may be taken as a statement of the most striking difference. In irritant poisoning, the evacuations are often tinged with blood ; in Cholera (British)

¹ Medical Jurisprudence, p. 80.

they are not tinged with blood, but commonly deeply coloured with bile. Irritant poisoning may occur at any season. Persons do not often die from an attack of English Cholera; and when the disease does prove fatal, it is commonly after three or four days from its commencement. In irritant (arsenical) poisoning, death is a common result within twenty-four hours, when the symptoms produced by the poison are such as to have resembled those of cholera." Dr. Christison too places some reliance on the circumstance that death from cholera is much less frequent than from poisoning, and that, when it does occur, the preceding illness is generally of longer duration in the former. The question as to time—which must always be liable to fallacy—has been much controverted, as well as that of the occurrence or not of sanguinolent vomiting, which, if it is more frequent in cases of poisoning, is by no means impossible in cholera. The fact of the sense of acidity in the throat being experienced in poisoning previous to the vomiting, and not till after in cholera, is perhaps as good a ground of distinction as any of the above. Here, too, the fact of the sufferer having complained or not of symptoms characteristic of the first stage of cholera, would afford some clue.

52. One of the most interesting and important questions on the subject of British or Bilious Cholera

is that respecting its connexion or identity with or essential difference from its Asiatic prototype. We start with the proposition, that the two diseases are entirely and essentially different. It is of course assumed, that the causes and nature of British Cholera have been correctly demonstrated in the foregoing pages, that is, that the disease is essentially one of the blood, is consequent upon the accumulation of carbon in some form in that fluid, the deteriorated condition of which is first exhibited in the characteristic and well-defined symptoms which constitute the initiatory stage of the malady ; that, in consequence of this condition of the blood, an effort is made to cast off the injurious accumulation, through the liver, the first effect of this effort being the secretion, excretion, and sudden flow of an inordinate quantity of generally acrid bile into the stomach and bowels, causing, in the first place, either bilious vomiting or purging, but generally the two conjoined ; that, in severe cases, “the great irritation of the sympathetic nerves in the intestinal canal, by being propagated to the central organs of the nervous system, gives rise to secondary general cramps,” as “the cramps in sporadic cholera ;”¹ and that further, the bilious evacuations may be supplanted by the conjee or copious rice-water stools, accompanied with every symptom of collapse which

¹ Muller's Physiology, part iii, p. 112.

characterizes the Asiatic disease ; that this collapse may end in death, but that if recovery takes place the convalescence is generally unusually rapid ; whereas, in Asiatic Cholera, the stage of collapse is, according to some authors, necessarily followed by that of choleric fever.¹ This ground of distinction between the two diseases will be referred to hereafter. From the above definition, we find that in British Cholera, the vomiting, the purging, the cramps, and collapse must be regarded in the light of effects merely ; that, though usually described as the constituents of the disease, they are but its terminations, analogous to the natural diaphoresis or acid urinary excretion, by which the system relieves itself of the effects of checked perspiration in a common cold. Looking for the causes of these effects to the initiatory phenomena of British Cholera, we have been led to fix upon the accumulation of carbon in the blood as the essential of the disorder.

53. Assuming the conclusions respecting the essential nature of British Cholera to be correct, it remains to inquire what are the essentials of the Asiatic disease with which it is to be compared. In both diseases similar prominent symptoms are developed. Wherein lies the difference ? Beyond slight general indisposition, or gentle diarrhœa, no description is given

¹ Cyclopædia of Practical Medicine, art. Cholera.

by writers, of any initiatory stage of the Asiatic Cholera, corresponding to that which precedes the British. In the Petersburg Report of Drs. Russell and Barry, published by the Board of Health in 1831, it is said, "We have but few opportunities of witnessing the presence of all the symptoms, some of which precede the complete seizure by so short an interval, that the utmost diligence is scarcely sufficient to bring the patient and the physician together, after their occurrence, before the disease is fully formed. Diarrhœa, at first feculent, with slight cramps in the legs, nausea, pain or heat about the pit of the stomach, give the longest warning." Dr. Brown says, "In an immense majority of instances, diarrhœa has been the prominent symptom of the incipient stage."¹ The foregoing extract, from the experience of Drs. Russell and Barry, is pretty nearly an embodiment of the descriptions given by writers generally of the preliminary symptoms of Asiatic Cholera, which is frequently described as attacking persons previously in perfect health; this previous perfect health, has been more particularly adverted to in those cases cited by the contagionists, as instances of healthy individuals being suddenly attacked, after communication with the affected; in descriptions too, of the commencement of the epidemic, in any locality, the sudden seizure, at one

¹ Cyclopædia of Practical Medicine, art. Cholera.

time, of many individuals, who had not complained previously, is generally a prominent characteristic. This feature of the disease was amply exemplified, in many places, during its progress through this country in 1831-2. Amid other examples in India, the Kurra-
chee epidemic of 1846, which attacked the 86th regiment, was described as coming on in this rapid manner; many were struck down, all together. Mr. Thom, surgeon to the regiment, in describing the cases, says,¹ "In three fourths of the cases, the attacks were sudden, often within a few minutes; in the other, there were occasionally precursory symptoms, often for a few hours, or even a day beforehand." In a paper on 'The Causes and Propagation of Asiatic Cholera,'² the writer says, "We have known in a cantonment, perfectly free from the disease, ten men of the same regiment to be attacked in a single night, and every one of these cases to be fatal, while neither in this or the other regiments at the same station did any subsequent case occur at this time." The difference between the two diseases in their mode of onset is most remarkable; the suddenness of the attack of Asiatic Cholera, both individually and collectively, contrasts with the gradual rise of the British, described in the first part of this treatise; even did the former disease depend essentially

¹ Medical Times, April 17th, 1847.

² British and Foreign Medical Review, April 1847.

upon some alteration in the properties of the blood, as some suppose, its mode of attack indicates that the alteration must be of a much more rapid character in the former, than in the latter. It certainly has been fully proved,¹ that when the attack of Asiatic cholera is completely established, the chemical properties of the blood have undergone considerable alteration, whether the alteration be cause or effect, is a question.

54. It has been shown that in British Cholera, the vomiting and purging are non-essential to the disease, the same thing may be said of the Asiatic. Dr. Parkes, in his recent work on Cholera,² says, the vomiting, purging, and cramps, must be considered merely as usual but non-essential symptoms of cholera," and also "cases of cholera may occur entirely divested of these symptoms." Writers on Asiatic Cholera seem to agree that the most fatal variety of the disease is denoted by the slightness of the commotion in the system. Dr. Brown says³ of this variety: "there was no vomiting, hardly any purging," "no perceptible spasm," "no pain," "a mortal coldness, with arrest of the circulation coming on from the beginning, and the patient dying without a struggle, within three or

¹ O'Shaughnessy, Lassaigne, Thomson, Lecanu. See also Parkes on Cholera.

² Page 94.

³ Cyclopædia of Practical Medicine.

four hours.” Mr. Thom, in his description of the cholera at Kurrachee, gives a similar account of such cases, which have likewise been dwelt upon by Drs. Russell and Barry, Johnson, and others. Lastly, Mr. Davey says,¹ “ many persons are in the habit of supposing cholera to be attended with invariable symptoms. Amongst these are vomiting and purging. I have often, during a temporary residence in Bengal, and other parts of the East, seen very unequivocal examples of the disease, unattended with either of those symptoms.” In the above cases, death is likened by many of the writers to that resulting from some sudden concussion of the nervous system. Here then we find those symptoms which have been most prominently dwelt on, from which the two diseases have taken their common synonyme, are non-essential to either, but from very different reasons. In British Cholera, actual vomiting and purging may not occur, the affection of the blood may go to but a small extent, and the cause ceasing to act, the morbid matter may be imperceptibly discharged, even although the symptoms of the essential disease had shown themselves ; moreover, cramps do not generally occur in slight cases, but almost invariably attend those characterized by severe vomiting and purging. In Asiatic Cholera, when the vomiting,

¹ Lancet, Sept. 17th, 1836.

purging, and cramps are absent, it appears, and is thought by many, to be in consequence of sudden overpowering shock communicated to the nervous centres, which extinguishes by its severity many of the effects developed by a less grave form of the disease. Dr. Parkes says,¹ “it was a matter of familiar observation, that in the worst and most rapid cases, there were hardly any spasms.” Also that “a case with little vomiting is more malignant, and more rapidly fatal,” than one in which that and purging were prominent symptoms.

55. Considering, then, the vomiting, purging, and cramps, and the consequent effects upon the system at large in Asiatic Cholera, to be the effects merely of some prior cause, the rapidly fatal cases above alluded to, must be regarded as the purest form of the disease. The symptoms in these cases are so indicative of a nervous system affected in a manner peculiar and inexplicable, that inquirers have naturally been led to look to that system for explanation. Among the earlier investigations, M. Keraudren says, “the first stage of this malady appears to be essentially nervous or spasmodic.” Dr. Ainslie considered that “the nervous influence received the first morbid impression in cholera.” Mr. Twining’s evidence tends to the same point; he says, “in an assemblage of those symptoms, which constitutes

¹ Parkes on Cholera, p. 91.

the early stage of a sudden invasion of cholera, we observe evidence of the disorder, or a total cessation of the functions of those organs which are supplied with nerves from the great solar plexus ;” and again he says, “ the fatal termination of cholera in some of the most sudden cases, commencing with extreme collapse, seems to depend on the intensity of the efficient cause of the disease, acting so powerfully on the nervous system as to produce total arrest of all vital energy, and death as it were by suspension of animation, a cessation of vital actions taking place with hardly any preliminary course of disease.” Dr. Kennedy considers “ Epidemic Cholera” to be “ an affection of the nervous system similar to that produced by concussion of the brain, and those cases rapidly fatal without either vomiting or purging, to be from paralysis of the whole alimentary canal.” Mr. Thom, in his account of the cholera at Kurrachee, says, “ the pure pathognomonic symptoms of the disease as we met it were loss of nervous power.” Lastly, Dr. Brown, in the ‘ Cyclopædia of Practical Medicine,’ adds his testimony to the above, saying, “ that the nervous system generally, and especially the ganglionic and spinal nerves, and the spinal medulla itself, are affected, is manifest from many symptoms ; but whether this affection arises from a direct impression of the remote cause of the disease on those

organs, or from irritation propagated from the alimentary canal along the ganglionic nerves to the spine, we are ignorant.” Perhaps the following observation of Dr. Brown adds something to the testimony which goes to prove that the nervous system is peculiarly affected : he says,¹ “ There were feelings experienced by various persons, either otherwise in perfect health, or labouring under complaints distinct from the epidemic during its prevalence, such as spasms, thrilling sensations of the extremities, and various affections of the nervous system, which appeared to betoken the influence of some cause more generally diffused than contagion.

56. Led by the symptoms of the disease to trace back its origin to the nervous system, inquirers have endeavoured to verify their opinions by post-mortem investigations, many of the results of which have been recorded. Among others, Lizars and Delpech found the brain, spine, and ganglia affected in many of the cases examined by them during the epidemic of 1831-32. Dr. Brown, in the ‘ *Encyclopædia of Practical Medicine*,’ says, “ in the head are found marks of congestion, and even occasionally of extravasation. Such appearances were not of uniform occurrence in the dissections performed in Hindostan, but they were found very constantly in those made by Dr. Davy, in Ceylon ;

¹ *Cyclopædia of Practical Medicine*, art. Cholera.

and Dr. Keir, of Moscow, discovered in the Russian disease, the blood-vessels of the brain and its membranes more or less turgid with blood, particularly towards the base, with a fluid effused into its convolutions, and more or less of serum in the lateral ventricles." The same author says, "In one case only in India was the state of the spinal marrow examined, and in that, strong indications of inflammation were detected in its sheath; the case, however, was in some degree a mixed one." But Dr. Keir found at Moscow, the blood-vessels of the vertebral column and spinal cord more or less loaded with blood, which was sometimes effused between its arachnoid and dura mater; partial softening of the substance of the spinal cord was sometimes met with, and marks of inflammatory congestion in the larger nerves were detected. Dr. Parkes says, "that the most usual appearances in the head, consist in the accumulation of blood in the veins of the dura and pia mater, and in the effusion of serum or of blood consequent upon this. This congestion is sometimes as great in recent cases, as in cases of consecutive fever with head symptoms. It is considerable in most malignant cases; but I am unable to say whether the accumulation of blood, and the rapidity or malignity of the case, bear to each other any determinate ratio." In addition to

¹ Parkes on Cholera, p. 12.

the support afforded by the pathology of Asiatic Cholera itself, to that view which regards the nervous system as primarily and principally implicated, may be cited the description of a disease reported by Dr. Mayne in the ‘ Dublin Journal of Medical Science,’¹ which he names “cerebro-spinal arachnitis.” This disease prevailed in the Irish workhouses, and has also been observed in France to attack recently joined conscripts. The commencing symptoms are described as formidable, and the attack very sudden. At first the symptoms are those of collapse, closely resembling cholera; with reaction, tetanic symptoms occur, or convulsions ending in coma. Pathology.—Arachnoid in brain and spine inflamed, in the latter most so, and lymph effused in various situations.

57. Taking those cases of Asiatic Cholera which prove rapidly fatal to constitute the pure type of the essential disease, dependent upon sudden violent affection of the nervous centres, to a minor affection of those centres must be ascribed the most general form of the disease, producing vomiting, diarrhœa, and cramps; failure of the heart’s action, impeded respiration, the perverted state of the blood, and local congestion. It needs not illustration to show that cramps and spasms are the effects of congestion, or other sources of irritation at the nervous roots. That

¹ Ext. Medical Times, Oct. 3d, 1846.

diarrhœa may be produced by affection of the nervous system alone, cannot be doubted : to this source only can we refer the diarrhœa of fright, anxiety, or mental excitement, and probably also that similar affection produced by electrical excitement of the atmosphere. Melæna is sometimes said to result from violent passion. In Asiatic Cholera, it would seem, when preliminary diarrhœa does occur, that the attack—the affection of the nervous system—is so mild, that it produces only slight determination to the bowels, some what similar to that which takes place in the cases above cited ; but that when the disease assumes its more severe aspect, certain components of the blood are, as it were, precipitated upon the mucous coat of the bowels, which gives them free exit. The power of nervous influence in producing copious, superabundant excretion, or exhalation from glands or glandular surfaces, which usually secrete fluid in moderate quantities only, is sufficiently evinced in many cases, but especially in the enormous flow of urine through the kidneys, which frequently occurs in hysterical affections. It is probable, moreover, that the sweating sickness of the sixteenth century may have been ascribable to some affection similar to cholera, in which, instead of being determined to the mucous coat of the bowels, the fluid passed off by the skin ; many of the symptoms of the disorder closely resembled cholera.

In illustration may be cited a sporadic case of sweating sickness reported by Dr. Laurie,¹ as having lately occurred in Glasgow, the symptoms of which supported this view, which is rendered still more probable by the circumstance that the profuse sweat of the algide stage of malignant cholera sometimes becomes the most prominent symptom, as it is described to have done in the late Kurrachee epidemic.

58. By some, the cold stage of Asiatic Cholera has been regarded as one, and the first stage merely, of a febrile disease ; this disputed view may or may not be correct : it is evident, however, that whatever there may be in the nature of Asiatic Cholera to cause a febrile paroxysm, either regularly or irregularly, to follow the cold one, it is evident there is nothing in the nature of British Cholera likely to cause such an effect, and that when fever does arise after the latter disease, it is probably owing to muco-enteritic irritation left by the attack. When it is considered in what situations British Cholera most prevails, the possibility of such a febrile attack degenerating into typhus becomes evident.

59. The condition of the blood in Asiatic Cholera has, of course, attracted attention. Dr. O'Shaughnessy, with a view to ascertain the state of this fluid in unaffected persons during the prevalence of the

¹ Journal of Medical Science, vol. vii, p. 241.

disease, and in those suffering from the premonitory symptoms, made repeated analyses ;¹ his conclusions were :—

1. In the premonitory symptoms no alteration of the blood exists.

2. In the cases in which the evacuations are trivial, and the cramps form the prominent symptoms, the blood is also unaltered.

3. The alteration of the blood, consisting in loss of water and saline matter, only occurs in the collapse cases, preceded by excessive rice-water evacuations.

4. The blood of healthy persons resident in infected districts or houses, is not chemically changed in the least degree. According to the same investigator, the blood, after the disease is fully formed, has a greatly reduced proportion of water and salts, and according to Lassaigne and Thomson, a diminished proportion of fibrine ; its alkalinity also is diminished. Lecanu found that the proportion of solid matter to water, in the completely “tarry” blood, was more than double that of health ; these circumstances correspond with the chemical composition of the alvine dejections. Examined with a powerful instrument, the microscopical structure of the corpuscles is seen to be preserved, and when exposed to the air the blood assumes a fine scarlet colour, which, with

¹ Lancet, August 11th, 1831-2.

other circumstances, would appear to establish the fact, that the susceptibility of aeration is not destroyed.¹ Dr. Parkes, in his recent work, mentions the condition of the blood in the cases examined by him, generally to have been dark, fluid, and frequently incoagulable. Drawn during life, it did not coagulate in some cases ; when it did, the clot was usually loose and grumous. “ In a little less than a quarter of the whole number of cases,” examined by Dr. Parkes (thirty-nine in all), “ the presence of fibrine in the blood was not indicated by coagulation, either in or out of the body.” Without extending inquiry further, from the above we may conclude that, as yet, there is no evidence, either *from the premonitory symptoms of the disease* or from analysis of the blood, to afford reason for the conclusion that any perceptible change has occurred in that fluid, before the attack of Asiatic Cholera is fully formed in the system; that when the attack is established, the prominent features presented by the blood are—deficiency of oxygenation, but the power of aeration retained ; power of coagulation impaired or lost ; fibrine, serum, and salts more or less diminished. With respect to the apparently thickened condition of the blood, Dr. Parkes says,² “ In fact, the apparently thickened condition of the blood seems to arise from the unse-

¹ Ancell on the Blood, Lancet, Sept. 5th, 1840.

² Parkes on Cholera, p. 112.

parated portion of fibrine partially losing its solubility, and being suspended, as it were, in the serum.

The condition of the blood within the vessels being considered by the same author to depend on "some change" "which is not yet recognised by us, but truly latent and occult; and which is the first effect of the reception and incubation of the choleraic virus."

60. Some have attempted to locate the seat of Asiatic Cholera in the alimentary canal: it appears to be generally admitted, that the conditions usually discoverable in it, and in the abdominal viscera, are too insignificant and variable to account for the phenomena of the disease. The contents of the alimentary canal are probably in this case more important, in connexion with the nature of the malady, than the condition of the viscus itself, more especially the white flaky substance often found in large quantity in the canal, and now generally considered to be either fibrine itself, or at least one of the proteine constituents of the blood. Dr. Parkes, who appears to have paid much attention to the substance just mentioned, says, "The quantity of clotted substance effused into the intestinal canal, although generally great in malignant cases, is not in absolute proportion to the severity of the case;" in those fatal instances, when, as Mr. Scott says, "an arrest of the circulation comes on from the commencement, and the

patient dies without a struggle," there is, comparatively, little of the proteine compound effused: in fact, there is in all probability no time for such effusion. Is it mere coincidence in connexion with this fact of the excretion of a proteine compound from the blood, or is it not something more than coincidence, that, according to late researches,¹ that affection of the nervous system, the puerperal convulsion, has been found to be connected with discharge of a proteine compound—albumen—by the kidney? Is it not something also more than coincidence, that we find, under similar circumstances, after scarlatina, there also exists a tendency to nervous spasm?

61. Probably, there is no feature of Asiatic Cholera more peculiarly characteristic than its mode of propagation and extension, none, certainly, is more interesting. Climate, simply, that is, the vicissitudes of temperature, do not appear to exert much influence over the progress of the pestilence; it spreads alike in the heat of India and in Russian cold. An adverse wind, if it retards, certainly does not hinder its advance; this seems admitted on all hands; and in the Russian Reports, dated St. Petersburg, Nov. 19th, 1847, it is stated that the progress of the cholera was invariably against the wind. The writer

¹ Professor Simpson, Monthly Journal of Medical Science, October 1847.

in the 'Cyclop. Pract. Med.' describes "it as extending its territory in spite of the opposition of continued and violent monsoons." Meteorological phenomena have been much regarded in connexion with Asiatic Cholera; the first appearance of the disease in the Delta of the Ganges was preceded by a succession of violent thunder-storms; and Mr. Orton says, its progress through the country, at first, was accompanied by circumstances somewhat similar to those which attended its origin. During the prevalence of the disease, an increase of cases has been noticed after electrical disturbance of the atmosphere; after a severe thunder-storm on the 2d of August, 1832, "in some districts in London a considerable increase of cases took place."¹ As some support to the opinion, that electricity is active in the production of disease, we may quote a paper of M. Pallas, chief physician of the army in Africa, read before the French Academy of Sciences, June 7th, 1847.² He "asserts that the greater number of diseases, particularly neuroses, are due to the influence of diffused electricity, the principal sources of which are thunder clouds and marshy soils. By their geographical constitution and effects upon the human organism, marshes (says M. Pallas) present the closest analogy with the galvanic battery. Their deleterious

¹ Lancet, August 11th, 1832.

² Medical Times, June 19th, 1847.

effects are formidable in exact proportion with the quantity of saline or organic matter contained in the waters ; and observation proves, that diseases developed by the influence of marshy emanations are at first of a nervous nature."

62. Whatever objections may be raised by some to the opinion which assigns to meteorological changes some share in the production of Asiatic Cholera, no doubt can exist respecting the influence exerted upon the progress and extension of the disease by soil, situation, and topographical conditions generally. Some marshy situations on the banks of rivers have been fatally demonstrated as the nurseries of the pestilence. The "peculiar attachment to rivers, and the way in which it spreads along them, independent it may be of human intercourse (Orton and others), is indeed a very peculiar feature, and one almost distinctive of cholera."¹ It appears, indeed, as if the choleraic poison, whatever its nature, is more peculiarly developed in damp rather than very wet ground, is confined more especially to the immediate bank of the river. Heavy rains frequently put a stop to the epidemic ; and when it attacks a town, close on the banks of a stream or marsh, it does not appear to extend inland, neither does it appear to affect the crews of vessels lying in the middle of a river, to the same extent that it does those of such

¹ British and Foreign Medical Review, April 1847.

vessels as are nearer the bank.¹ On the other hand, it is pretty generally admitted, that elevated, and consequently dry, situations are most exempt from the attacks of Asiatic Cholera, and that "dry sandy soils are unfavorable to its development." Like most other epidemic diseases, Asiatic Cholera is influenced by the condition of the population amongst which it prevails. The fact is one requiring no illustration, that wherever there is vice, filth, extreme poverty, and a crowded locality, there cholera is most frequent and most fatal. In connexion with the above, however, it is worthy of remark, that during the prevalence of cholera in Paris, "not one of the men or boys employed at Montfaucon was attacked,"² although these individuals live in the midst of filth and putrid emanations.

63. The last and most striking characteristic of the progress of Asiatic Cholera is the apparently unaccountable caprice with which it selects the places it attacks ; without apparent cause, taking one side of an encampment and missing the other, leaving one or two villages in a district, and returning in a few months to devastate the previously exempt localities ; in short, *apparently* disregarding all law or rule in its extension. Two of the most remarkable instances of total unaccountable exemption from the

¹ Parkes on Cholera, p. 160.

² British and Foreign Medical Review, April 1843.

disease are related in the 'British and Foreign Medical Review,' April 1847. The first in the case of the island of Sundeeep, in the Sunderbunds, which "remained in 1818 and 1819 perfectly free from cholera, although the islands all round it, similar in position, cultivation, and geological features, suffered frightfully, and for long periods from the disease." "Free and uninterrupted intercourse was carried on the whole time between Sundeeep and the adjoining islands." The second instance is that of the island of Kristofsky, in which not a single case occurred during the prevalence of the cholera at St. Petersburg, notwithstanding the constant uninterrupted communication between the two places by the bridges and numerous barges.

64. In summing up the foregoing sketch of the most prominent features of Asiatic Cholera, we find, in the first place, a disease characterized by the suddenness of its attack, unmarked by any initiatory stage, or at least by one of very brief duration; the chief premonitory symptom in the majority of instances being diarrhœa, which can be regarded only as a mild commencement of the disease, not a stage of formation. Further; we find in Asiatic as in British Cholera, that the same prominent symptoms, the vomiting, the purging, and even the cramps, are non-essentials of the disease, and are

to be regarded only in the light of effects from some prior cause. The rapidly fatal cases occurring without these non-essential symptoms, have been cited as constituting the pure type of the disease, and their nature described to be such as to lead many esteemed authorities to look to some peculiar affection of the nervous system, wholly or partially, as the chosen seat of the Asiatic pestilence, and, in elucidation of this view, to examine carefully the pathological conditions of that system; and it has been shown that, in many cases at least, post-mortem examination has demonstrated serious implication of the nervous centres. The power of pure nervous influence in exciting increased alimentary or other discharge has likewise been referred to. In noticing the peculiar proteine compound discharged into the alimentary canal, it has been remarked, at least as a coincidence, that lately there has been found to exist some connexion between the (nervous) puerperal convulsions and the discharge of albumen—proteine—from the kidney. Passing to a consideration of the state of the blood, authority has been quoted to show, that according to some it is unaffected previous to the full formation of the disease, and that then the changes are just such as might be expected from the draining off of a large proportion of its components, but that the power of aeration

remains. Lastly, looking to the peculiarities manifested in the propagation of the disease, we see it, uninfluenced by temperature, carrying its path of destruction against powerful winds; according to some, excited to activity by electrical excitement, like other epidemic diseases, clinging wherever there is damp, filth, misery, amid a crowded people, but at the same time frequently manifesting the utmost apparent capriciousness in its progress. The authorities that have been quoted, the evidence which has been adduced, may, perhaps, in a case which is still involved in so much doubt, obscurity, and disputation, as the essentiality of Asiatic Cholera, justify the writer in siding with those who look upon it as an affection of the nervous system; and peculiar indeed must be the state of that system, which enables the mind, contrary to all our usual observations, to remain clear to the moment of death, whilst blood, unoxygenated, and perhaps of "tarry" consistence, tries to circulate through the brain.

65. We started with the proposition, that the two diseases, British and Asiatic Cholera, were essentially different. Assuming, as correct, that British Cholera is a disease of the blood, if it be true that Asiatic Cholera is a disease of the nervous system, no apparent similarity could make them identical; but, though convinced of the truth of the assump-

tion made, as far as the British disease is concerned, and though feeling that upon it we may legitimately base our arguments, we are scarcely entitled to a similar privilege in the case of the Asiatic, however sure we may be of the correctness of the theory. The assumption is not required; comparison of the individual features of the two diseases display too many points of difference to allow of their being classed as modifications, even of the same affection. We have seen that British or Bilious Cholera is dependent for its development upon a certain degree and continuance of elevated temperature, either in this or other countries; it is gradual in its rise, keeps pace with the high temperature; its approach, marked, individually and collectively, by well-defined initiatory symptoms of some duration, it affects uniformly—under certain modifications—the whole district exposed to the exciting cause. On the other hand, Asiatic Cholera, whilst apparently exhibiting extreme capriciousness in its spreading, still holds on its steady course in certain general directions over the world; uninfluenced by temperature, not prevented by the wind, it attacks one place after another, and seizes its victims, almost without one warning symptom. But we have both diseases called by one generic name, and that name derived from the similar prominent symptoms exhibited by each—the violent

vomiting and purging, which constitute the common ground on which they meet, which spring from the same plane (so to speak) of the alimentary canal, on which each disease exerts its own peculiar effect ; but from this common ground each branches off to its separate origin,—the British Cholera through the biliary organ to the blood, the Asiatic through the nerves of the canal, to the nervous system at large. Cut off these common symptoms, the vomiting, purging, and cramps—none of which are necessary to the essentiality of either disease—and we have two perfectly distinct affections, with, however, this important fact to be remembered, that British Cholera, by irritating the nervous centres through the nerves of the alimentary canal, may produce, by reflected action, the cramps, the rice-water stools, the consequent collapse, and other symptoms, thus, may closely simulate the Asiatic disease. If such be the case, we can scarce wonder that when the virus of the pestilence is abroad, diarrhœa, Bilious Cholera, or other irritation of the bowels, should strongly predispose to its development. The conclusion is inevitable, that in removing those causes which have been noticed as favouring the formation of British Cholera and similar diseases in the system, much is done to ward off the attack of the more formidable pestilence.

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